Interdisciplinary Learning in the International Baccalaureate

Submitted to the International Baccalaureate by Ecctis

Commercial in confidence

June 2021

Ecctis

Acronyms

IB	International Baccalaureate
ATT	Approaches to teaching
ATL	Approaches to learning
LP	Learner profile
IM	International-mindedness
K-12	Kindergarten to 12th grade
PYP	Primary Years Programme
MYP	Middle Years Programme
DP	Diploma Programme
CP	Career-Related Programme
FPIP	From Principles into Practice
TSM	Teacher support material
WIAIBE?	What is an IB education?
PS&P	Programme Standards and Practices
RQ	Research question
ESS	Environmental Systems and Societies
CAS	Creativity, Activity, and Service
TOK	Theory of Knowledge

Abstract

Interdisciplinary learning has widely been shown to have beneficial outcomes for students, to correspond with the skills and competences needed in further study and workplaces, and to be a vital conduit for (and component of) progressive pedagogy. Noted benefits of interdisciplinary learning include enabling student-led learning transfer and creating meaningful connections between content areas. There are also clear links between interdisciplinary learning and key skills and competences such as critical thinking and synthesis. Effective implementation of interdisciplinarity also faces many challenges in K-12 education contexts. These challenges range from issues such as how interdisciplinary learning should be defined, and how it relates to adjacent ideas such transdisciplinarity, to the practicalities of implementing interdisciplinarity in assessment and enabling teachers to develop effective interdisciplinary teaching approaches. This report is motivated by the International Baccalaureate Organisation's desire to gain a better understanding of promising practices for how interdisciplinary learning should be embedded within K-12 programmes of education. The current analysis presents a set of promising practice for K-12 interdisciplinary learning and explores how this compares to current practice in the IB's four programmes: Primary Years Programme (PYP), Middle Years Programme (MYP), Diploma Programme (DP), and Career-Related Programme (CP). The study employs an extensive literature review and a detailed document audit in order to produce both wide-ranging and detailed conclusions as well as considerations for further research and amendments to current IB practice. Overall, IB programmes were found to embed a significant proportion of promising practice to a high degree, but there is also scope to move closer towards promising practice in some areas by strengthening clarity and consistency, and providing more detail in aspects of the IB's approach to interdisciplinary learning.

Executive Summary

Context

Interdisciplinary learning has widely been shown to have beneficial outcomes for students, to correspond with the skills and competences needed in further study and workplaces, and to be a vital conduit for (and component of) progressive pedagogy. Noted benefits of interdisciplinary learning include enabling student-led learning transfer and creating meaningful connections between content areas. There are also clear links between interdisciplinary learning and key skills and competences such as critical thinking and synthesis. Effective implementation of interdisciplinarity also faces many challenges in K-12 education contexts. These challenges range from issues such as how interdisciplinary learning should be defined, and how it relates to adjacent ideas such transdisciplinarity, to the practicalities of implementing interdisciplinarity in assessment, and enabling teachers to develop effective interdisciplinary teaching approaches. This report is motivated by the International Baccalaureate Organisation's desire to gain a better understanding of promising practices for how interdisciplinary learning should be embedded within K-12 programmes of education. The desired outcome is for the IB and IB World Schools to be able to refine current approaches to interdisciplinary teaching, learning, and assessment and move further towards promising practices in the deployment of all four IB programmes.

Scope, Objectives, and Methodological Approach

This report presents a set of promising practice for K-12 interdisciplinary learning and explores how this compares to current curriculum approaches in the IB's four programmes: Primary Years Programme (PYP), Middle Years Programme (MYP), Diploma Programme (DP), and Career-Related Programme (CP). Research and analysis were driven by four key research questions, addressed through four key methodological components:

Figure 1: Research Questions and Methods Used

Research Question 1: What does the international literature suggest about the effective interdisciplinary education models for ages 6-19?

Research Question 2: What effective evidence-based policies, models and promising practices exist at the global level to address/promote/integrate interdisciplinarity in education for students aged 6-19?

→ Literature Review

Research Question 3: How does IB programmes' interdisciplinarity approach compare with extant research and global promising practices?

→ IB Resources Overview

→ Application of Benchmarking Tool

Research Question 4: What are the policy and practice implications of the collective findings about approaches to interdisciplinary learning from the literature review and curriculum audit for IB?

→ Conclusions and Considerations

The interrelationship of these methodological components is represented by the following diagram:

Figure 2: Relationship between Methods Used
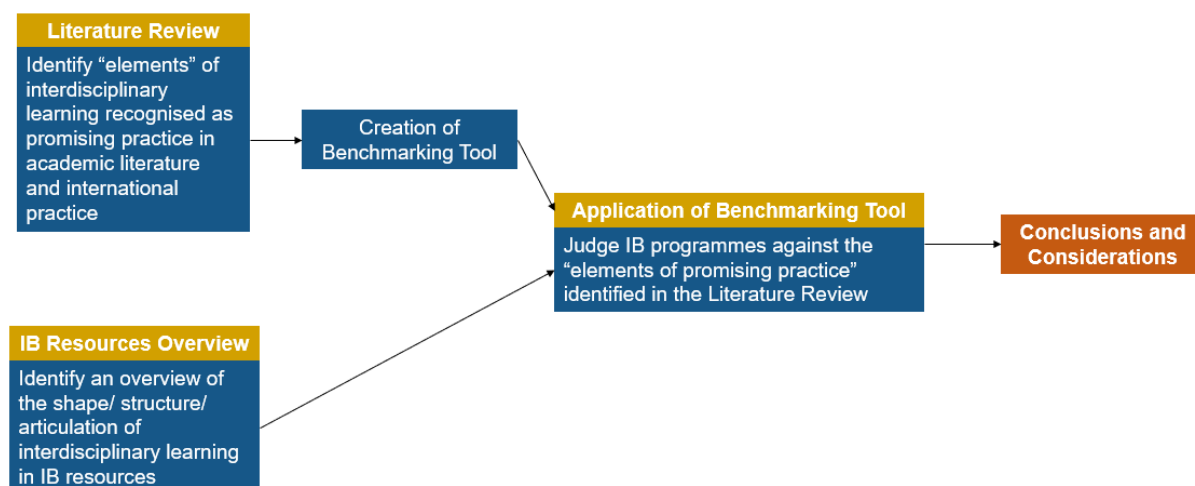
Literature Review

Research Question 1: What does the international literature suggest about the effective interdisciplinary education models for ages 6-19?

Research Question 2: What effective evidence-based policies, models and promising practices exist at the global level to address/promote/integrate interdisciplinarity in education for students aged 6-19?

The Literature Review explored a combination of academic literature – discussing interdisciplinary learning (in theory and practice) – and national/organisational examples of interdisciplinary learning being deployed in various contexts. The academic literature base comprised a wide variety of different analytical and descriptive reviews of what interdisciplinarity means, how it can be effectively enacted in practice, the challenges facing implementation, and more. The methodological approach to the literature review is demonstrated by the following diagram:

Figure 3: Literature Review Methodology
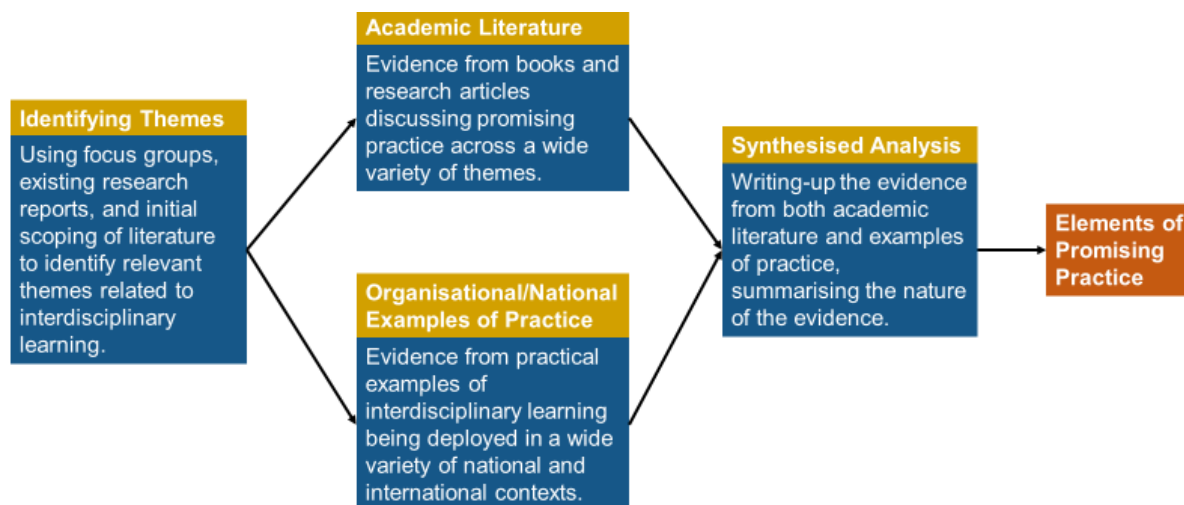
As this diagram shows, the output of the Literature Review was the identification of Elements of Promising Practice or EoPPs (along with detailed analysis and explanation of the relevant literature, research, and practice). However, alongside the EoPPs, the Literature Review also presented an opportunity to survey the state of the field of research into K-12 interdisciplinary learning. Some lessons learned from that process are listed below:

Literature Review: Highlights of Findings

- Defining Interdisciplinary Learning – There is not one universal definition of interdisciplinary learning (or the surrounding family of terms such as "transdisciplinarity") which should be deployed in all contexts. It is vital that stakeholders have clear and consistent definitions to work with, but these definitions must be driven by the *purpose* for which interdisciplinary learning is being embedded into the curriculum.
- Interdisciplinary Learning and Constructivist Pedagogy – Interdisciplinarity is not a single variable, detachable from the wider constructivist pedagogy for which it is a powerful conduit and simultaneously a key constituent part. Conceptual understanding, inquiry-based and project-based learning, and student-led pedagogy (as well as other aspects of the constructivist approach already prioritised by the IB) are intricately entwined with interdisciplinarity. Promising practice indicates that all these pedagogic approaches, including interdisciplinarity, work most effectively in tandem with one-another.
- The Importance and Relevance of Interdisciplinarity – Interdisciplinarity is considered a more accurate reflection (compared to knowledge and competencies structured through disciplines) of real-world research and genuine roles in employment and industry. This indicates that promising practices for embedding interdisciplinarity into K-12 education should strongly highlight the real-world benefits of becoming adept at working in an interdisciplinary way, meaningfully transferring knowledge and skills.
- Initiation of Change – Although moving closer to identified promising practices primarily aims to change the way that students learn (this is the intended outcome), students

themselves are rarely the *initiators* of promising practice. The nature of most EoPPs identified in the literature review is such that moving closer towards promising practice would need to be initiated by curriculum design, teacher practice, or frequently both. There are some other factors which are related to the initiation of change, but (as Figure 4, below, shows), curriculum design and teacher practice are the two most notable factors which scaffold the promising practice to enable it as an experienced benefit and outcome for students.

- The Need for Further Research – The literature base itself is fractured, comprising of few large-scale or random controlled trials, and heavily relying on descriptions of small-scale practice or theorisation related to other contexts such as higher education. 18 Elements of Promising Practice were identified in this report, but these could be added to and further refined through numerous research avenues. The IB would be well positioned to contribute to the evidence-based understanding of interdisciplinary learning by exploring the issues described in the final section of this executive summary (The Limits of this Study and Avenues for Further Research).

Regarding the overall aim of answering this study's research questions, the most important output from the Literature Review was the Elements of Promising Practice. In total, 18 distinct EoPPs were identified which spoke to a variety different themes across the whole spectrum of issues relevant to K-12 education. The EoPPs are categorised below in relation to six themes synthesised from the topic-areas discussed by the literature reviewed.

All Elements of Promising Practice identified by the Literature Review are provided with their headline title in the table below (a further paragraph of description for each can be found in the body of the report). The figure to the right and the colour coding in the table below demonstrate six general themes within which the EoPPs can be classified. Where EoPPs cross multiple themes this is represented in the table and figure.

EoPP 1: To deliver a coherent, research-informed **definition** of interdisciplinary learning, which is guided by the intended **purpose** of deploying interdisciplinarity.		**EoPP 10:** To develop interdisciplinarity within an **age-appropriate** structure, with scope for **development** along the K-12 age continuum.	
EoPP 2: To engage clearly and coherently with the differences and similarities between **interdisciplinarity** and other related terms such as **multidisciplinarity** and **transdisciplinarity**.		**EoPP 11:** To explain the link between interdisciplinarity and key **skills and competences** including communication, critical thinking, synthesis, and metacognitive awareness of perspectives.	
EoPP 3: To ensure a significant level of teacher **scaffolding** to help students deploy disciplines and interdisciplinarity effectively.		**EoPP 12:** To take interdisciplinary learning into account in the **design of assessment**.	
EoPP 4: To explicitly link interdisciplinary learning with other features of **constructivist pedagogy**, including concept-based teaching, student-led inquiry, collaboration, and authentic learning.		**EoPP 13:** To **link interdisciplinary assessment** with conceptual understanding, disciplinary grounding, advancement through integration, and critical awareness.	
EoPP 5: To clearly articulate and communicate, to staff and students, the **value** and **benefits** of interdisciplinary learning.		**EoPP 14:** To encourage **interdisciplinarity** and individual **disciplines** to **mutually reinforce** one-another; with interdisciplinary methods being used to develop deep and innovative disciplinary understanding.	
EoPP 6: To promote the use of authentic **problem-solving** and interdisciplinary **project-based** learning as two key tools for developing interdisciplinarity in the classroom.		**EoPP 15:** To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual **nature of specific disciplines**.	
EoPP 7: To create sufficient **flexibility** in the curriculum for teachers to authentically link learning to student interests and new research developments, and to reflectively develop best practice approaches.		**EoPP 16:** To provide **continuing professional development** opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies.	
EoPP 8: To encourage the use of a wide variety of **multimodal** sources, enabling students to build their own links between disciplines and explore knowledge areas.		**EoPP 17:** To encourage and enable collaborative practices within schools which encompass **teacher-teacher collaboration** within an effective format but also involve a **school-wide effort**.	
EoPP 9: To show **proactive engagement** with the key **challenges** which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning.		**EoPP 18:** To **put time aside** in the curriculum which is explicitly for teachers to **reflect and collaborate** around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity.	

IB Resources Overview and Application of Benchmarking Tool

Research Question 3: How does IB programmes' interdisciplinarity approach compare with extant research and global promising practices?

Following the identification of the 18 EoPPs, IB resources and documentation were explored to understand how interdisciplinary learning was generally embedded into the IB and how the 18 EoPPs were specifically embedded within the IB's four individual programmes (PYP, MYP, DP, and CP).

The IB Resources Overview was the title given to the general exploration of how interdisciplinary learning was embedded within IB resources. This was the process of establishing a "bird's eye" view of how the IB deploys interdisciplinarity. Within the IB Resources Overview, Ecctis examined:

- The nature of different types of documents and resources used by the IB, and what structures or formats these documents and resources use to address interdisciplinary learning.
- The use of definitions within IB documents and resources which directly related to relevant ideas such as "interdisciplinarity", "multidisciplinarity", or "transdisciplinarity".
- The presence of interdisciplinary learning in key curriculum components which bridge all IB programmes, such as the Learner Profile, the Approaches to Teaching, and the Approaches to Learning.

A visual summary of the close examination of three key curriculum components is demonstrated in the figure below:

Table 1: IB Curriculum Components' Links to Interdisciplinary Learning

Key:
Explicit Link to Interdisciplinary Learning
Strong Implicit Link to Interdisciplinary Learning
Weak Implicit Link to Interdisciplinary Learning
No Link to Interdisciplinary Learning

Learner Profile Attributes		Approaches to Teaching Principles	Approaches to Learning Skills
Inquirers	Knowledgeable	Based on Inquiry	Thinking Skills
Thinkers	Communicators	Focused on Conceptual Understanding	Research Skills
Principled	Open-Minded	Developed in Local and Global Contexts	Communication Skills
Caring	Risk-Takers	Focused on Effective Teamwork and Collaboration	Social Skills
Balanced	Reflective	Designed to Remove Barriers to Learning	Self-management Skills
		Informed by Assessment	

As this table shows, all three of these key IB curriculum components contain at least implicit references to interdisciplinary learning in almost all components. Both the Learner Profile and Approaches to Teaching also contain single explicit links to interdisciplinary learning.

Once the "bird's eye" view of the IB's approach to embedding interdisciplinary learning had been established, it was possible for Ecctis to carry out a detailed examination of selected documentation and use this analysis to understand the extent to which each of the 18 EoPPs identified in the Literature Review were embedded within the IB's four programmes. The process of compiling evidence from IB documents and resources and developing embeddedness judgements for each of the EoPPs was labelled the Application of the Benchmarking Tool. The numbers and types of resource examined in this process were as follows:

Table 2: Summary of IB Resources Used in Audit

Cross-Programme Documents	FPIPs	"Core" Guides	Subject Guides	Teacher Support Materials
1	4 x PYP; 1 x MYP; 1 x DP; 1 x CP	1 x MYP[1]; 3 x DP; 2 x CP	4 x MYP; 6 x DP	4 x MYP; 4 x DP

The full list of exact documents and resources used in the Application of the Benchmarking Tool is available as a table in Section 5.2 of the report.

The output of the Benchmarking Tool was 72 individual judgements which summarised the level of embeddedness of each EoPP in each individual programme. Every judgement was categorised as one of: High Embeddedness; Moderate Embeddedness; Low Embeddedness; or No Embeddedness. For a full discussion of how these judgements were made and categorised, see Section 5 of the report. The top-level findings of the Benchmarking Tool are summarised in Table 3, below.

It is important to note that the embeddedness judgement levels should be read in the context of what programmes prioritise and aim to achieve through interdisciplinarity (see Section 7.2 for further discussion). Summarised briefly, what this means is that an embeddedness judgement of Low in a specific programme does not automatically necessitate a "fix". Instead, all these judgements should be viewed as a snapshot which captures the evidence of how each IB programme currently deploys examples of identified promising practice.

---

[1] *MYP: Projects Guide* was treated as a "core" guide due to the similar role it plays in the MYP compared to the core guides of the DP and CP.

Table 3: Summary of Benchmarking Tool Judgements

Elements of Promising Practice (Benchmarking Tool) Key: ■ = High embeddedness of element ■ = Moderate embeddedness of element ■ = Low embeddedness of element □ = No embeddedness of element	PYP	MYP	DP	CP
EoPP 1: To deliver a coherent, research-informed **definition** of interdisciplinary learning, which is guided by the intended **purpose** of deploying interdisciplinarity.	High	High	Low	Low
EoPP 2: To engage clearly and coherently with the differences and similarities between **interdisciplinarity** and other related terms such as **multidisciplinarity** and **transdisciplinarity**.	High	High	Low	None
EoPP 3: To ensure a significant level of teacher **scaffolding** to help students deploy disciplines and interdisciplinarity effectively.	High	High	High	High
EoPP 4: To explicitly link interdisciplinary learning with other features of **constructivist pedagogy**, including concept-based teaching, student-led inquiry, collaboration, and authentic learning.	High	High	High	High
EoPP 5: To clearly articulate and communicate, to staff and students, the **value** and **benefits** of interdisciplinary learning.	High	High	Moderate	Moderate
EoPP 6: To promote the use of authentic **problem-solving** and interdisciplinary **project-based** learning as two key tools for developing interdisciplinarity in the classroom.	High	High	High	High
EoPP 7: To create sufficient **flexibility** in the curriculum for teachers to authentically link learning to student interests and new research developments, and to reflectively develop best practice approaches.	Moderate	High	High	High
EoPP 8: To encourage the use of a wide variety of **multimodal** sources, enabling students to build their own links between disciplines and explore knowledge areas.	High	Moderate	Moderate	Moderate
EoPP 9: To show **proactive engagement** with the key **challenges** which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning.	High	Moderate	Moderate	Low
EoPP 10: To develop interdisciplinarity within an **age-appropriate** structure, with scope for **development** along the K-12 age continuum.	High	High	High	High
EoPP 11: To explain the link between interdisciplinarity and key **skills and competences** including communication, critical thinking, synthesis, and metacognitive awareness of perspectives.	High	High	High	High
EoPP 12: To take interdisciplinary learning into account in the **design of assessment**.	High	High	Moderate	Low
EoPP 13: To **link interdisciplinary assessment** with conceptual understanding, disciplinary grounding, advancement through integration, and critical awareness.	Low	High	High	Moderate
EoPP 14: To encourage **interdisciplinarity** and individual **disciplines** to **mutually reinforce** one-another; with interdisciplinary methods being used to develop deep and innovative disciplinary understanding.	Moderate	High	High	High
EoPP 15: To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual **nature of specific disciplines**.	Low	High	High	Moderate
EoPP 16: To provide **continuing professional development** opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies.	Moderate	Low	Moderate	Low
EoPP 17: To encourage and enable collaborative practices within schools which encompass **teacher-teacher collaboration** within an effective format but also involve a **school-wide effort**.	High	High	High	High
EoPP 18: To **put time aside** in the curriculum which is explicitly for teachers to **reflect and collaborate** around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity.	Low	Moderate	Moderate	Moderate

Headline Conclusions

Research Question 4: What are the policy and practice implications of the collective findings about approaches to interdisciplinary learning from the literature review and curriculum audit for IB?

In the body of the report, extensive discussion is provided around all findings and considerations. For ease of reading in this executive summary, considerations have been grouped under five headline conclusions (labelled A-E, below) which allow stakeholders to perceive some of the most notable outputs of this study at a glance. These five headline conclusions draw from all methodological components within the report.

> **Headline A) Looking across all programmes, the IB currently embeds more than half of the identified promising practice to a High degree. Although there is scope to develop further clarity and consistency in some areas, this indicates that the IB is in a strong position to refine effective approaches based on its current curriculum models.**

This conclusion may be of particular interest to: curriculum designers.

When we examine the summary of the benchmarking judgements, there are a handful of areas in which High embeddedness was found across all four programmes (EoPPs 3, 4, 6, 10, 11, 17). This indicates that the IB as a whole has strong practices in the following areas linked to effective interdisciplinary learning: scaffolding, pedagogy, problem- and project-based learning, age-appropriateness, development of key skills, and encouraging teacher-teacher collaboration and school-wide contributions. This strong foundation of embedding promising practice makes the IB well placed to develop improvements in other areas without needing to reconsider its broader pedagogic model, and to carry-out further research to continue identifying promising practice in areas outside the scope of this report.

Related Considerations:
Consideration 3: To consider, in depth, the place of interdisciplinarity in the assessment practices of all programmes. This consideration should focus on how each programme might articulate its top-level interpretation of how interdisciplinarity interacts with assessment in the programme as a whole. This does not mean that interdisciplinarity should be a part of all assessment practices in the IB, but where it is an important component it should be recognisable as part of a wider interdisciplinary learning strategy.

Consideration 4: Following consideration 3; to articulate in a new or existing cross-programme resource – which can be explicitly cross-referenced in subject guides and TSMs – the principles which link assessment to interdisciplinary learning in the IB (whether those principles vary from programme to programme, or if they do not).

> **Headline B) Different IB programmes have different stated aims in relation to interdisciplinary learning and embed interdisciplinary learning in distinct ways. As a result, the "policy and practice implications" (RQ4) are sometimes programme-specific.**

<u>This conclusion may be of particular interest to:</u> programme managers.

The PYP explicitly expresses itself as a programme driven by a transdisciplinary structure and this was substantiated by the audit's finding of widespread use of subject integration across the curriculum. The MYP curriculum model also suffuses interdisciplinary learning across all components, though some resources (focussed on specific curriculum components) articulate the emphasis on interdisciplinarity more clearly and extensively than others. The DP and CP are not explicitly interdisciplinary programmes but they do contain some elements which clearly channel interdisciplinary learning; specifically, parts of the core lend themselves to interdisciplinarity and some subject options (such as Environmental Systems and Societies and Literature and Performance) are highly interdisciplinary.

<u>Related Considerations:</u>
Consideration 11: To provide additional detail on how the disciplinary content in PYP subject areas can be delivered within the programme's transdisciplinary framework, with specific reference to how individual subject areas may need tailored approaches to be effectively developed within an integrated curriculum.

Consideration 15: To provide further detail in *PYP: FPIP – The Learning Community* regarding how teachers could be empowered to respond to topics of current interest and new research developments in order to shape the transdisciplinary content in their lessons.

Consideration 9: To provide more detail in DP and CP resources about the value and benefits of interdisciplinary learning.

Consideration 12: To describe the links between transferable professional skills and interdisciplinarity more explicitly in CP documentation. This explanation would help the CP to demonstrate a clearer framework for how individual curriculum components, including the core and Career-Related Study, can be seen as interlinked through a form of interdisciplinarity.

Headline C) There are genuine challenges to effective embedding of interdisciplinary learning into K-12 education, but there are also specific actions and opportunities which can help to overcome these hurdles in practice.

<u>This conclusion may be of particular interest to:</u> IB World School staff.

The Literature Review identified a number of specific challenges which face effective deployment of interdisciplinarity in K-12 curricula. These include (but are not limited to) the risk of only enabling superficial use of interdisciplinary examples rather than framing knowledge in a fundamentally interdisciplinary way, and the risk of failing to bridge the gaps in the methods, logics, and knowledge foundations of different individual disciplines. However, there are also specific actions which can pro-actively reduce the likelihood of these challenges impacting effective implementation of interdisciplinary learning. Such actions include effective and continuing professional development (CPD) for school staff, which is specifically related

to interdisciplinary teaching methods and content, as well as emphasising the conceptual links between disciplines at both a macro and micro level.

Related Considerations:
Consideration 2: A cross-programme resource could be developed which explicitly describes some of the challenges that are most likely to obstruct effective interdisciplinary learning. This resource could focus on suggesting promising mitigation strategies which could be applied across-programmes by teachers and schools.

Consideration 5: CPD that directly addresses interdisciplinary learning and is shaped by the EoPPs highlighted in this report should be highly recommended for all IB teachers.

Consideration 6: In all programme FPIPs it should be clearly articulated that school staff meeting time should be set aside purely for the development of more effective interdisciplinary learning.

Consideration 10: To explicitly recommend the use of multimodal sources to develop interdisciplinarity, and to provide more detail on this practice in MYP, DP, and CP documentation.

Headline D) **"Breadth versus depth", an idea sometimes discussed in the context of interdisciplinary K-12 curricula, is a false dichotomy. Instead, more focus should be placed on the pedagogic package within which interdisciplinarity is contained.**

This conclusion may be of particular interest to: curriculum designers and teachers.

A common discourse surrounding the implementation of interdisciplinary learning in K-12 education is: does this approach emphasise curriculum breadth over subject depth? A finding of this report is that this is a false dichotomy, because effective interdisciplinary learning should be part of pedagogic package which enables a balanced combination of both broad and deep learning. The links between interdisciplinarity and inquiry, project-based approaches, conceptual understanding, student-led learning, and other aspects of constructivist pedagogy, suggest that interdisciplinarity is not a distinct choice which pushes other priorities to one-side, but is part of an evidence-supported constructivist approach to learning. There is also not a set of distinguishable skills or competences which can *only* be delivered by an interdisciplinary structure. Instead, interdisciplinarity should be viewed as an effective conduit and a key constituent part of a broader constructivist package which enables development of both broad competences and deep subject knowledge.

Related Considerations:
Consideration 13: To make the "Conceptual Understanding" subsections found towards the end of both the DP and CP FPIPs describe interdisciplinarity and subject integration more explicitly, building on the existing discussion of how both programmes use concepts.

Consideration 14: To embed further explicit discussion of interdisciplinary learning into *MYP: Projects Guide* as this part of the curriculum is an important source of MYP interdisciplinarity,

but currently has clear scope for more dedicated explanation of its relevance to interdisciplinary learning.

Headline E) **If the specific purpose for deploying interdisciplinarity is clear and coherent – and clear definitions of key terms are well communicated – interdisciplinary learning can be appropriate for any age group.**

This conclusion may be of particular interest to: curriculum designers and programme managers.

One of the key findings of the Literature Review was that *how* interdisciplinary learning should be embedded into K-12 educational programmes should be shaped by the intended outcome of that interdisciplinary learning. There are a variety of different potential purposes (e.g. bridging and strengthening existing disciplines, developing knowledge of interdisciplinary topic areas, etc.), so it is essential that even the definitions of interdisciplinarity (and related terms) reflect the intended purpose. With strong ties established between what interdisciplinarity is intended to achieve and how the nature of interdisciplinary learning is communicated to stakeholders, interdisciplinary learning can be age-appropriate for any age group.

Related Considerations:
Consideration 1: To deliver more consistency with the definitions of interdisciplinarity, and the family of related terms, between programmes. A definitional glossary in a cross-programme document (such as *What is an IB Education?*) could provide useful framing.

Consideration 7: To provide more details in DP and CP documentation regarding the definition of interdisciplinary learning, and to ensure that the definition is placed within the context of how disciplinary integration is intended to take place in those programmes.

Consideration 8: In addition to the greater definitional clarity established by Consideration 1, to deliver more consistency and deliberate choices in DP and CP documentation regarding the use of the family of terms around "interdisciplinarity", particularly "multidisciplinarity" and "transdisciplinarity".

Beyond these headline conclusions, the following summary points of audit findings may be of interest to a variety of stakeholders:

- The PYP explicitly expresses itself as a programme driven by a transdisciplinary structure, with this approach being rightly presented as age-appropriate and able to channel the IB's aim of developing internationally-minded learners who can look beyond boundaries, whether those be cultural/national or disciplinary boundaries.
- The MYP explicitly takes interdisciplinarity into account in the design of the programme structure. There is specific curriculum space given over to fostering interdisciplinary learning, and the idea of interdisciplinarity also features across other parts of the programme such as the culminating projects and the fact that subject-areas rather than isolated disciplines are used to structure learning.

- The DP is not an explicitly interdisciplinary programme at the top level, but it does contain some elements which explicitly channel interdisciplinary learning. Specifically, parts of the core lend themselves to interdisciplinarity and some subject options (such as Environmental Systems and Societies and Literature and Performance) are highly interdisciplinary. However, it would also be possible to navigate some DP documentation without arriving at the conclusion that interdisciplinarity is a pedagogic priority.
- The CP is not an explicitly interdisciplinary programme, though it does contain some curriculum components which are either inherently interdisciplinary or have the potential to develop interdisciplinary learning. Of all four IB programmes, the CP was found to have the lowest explicit embeddedness of interdisciplinary promising practice, though it should be noted that 13/18 EoPP judgements for the programme were still judged to have either High or Moderate embeddedness.
- The stated aim of each IB programme is vital context for an accurate understanding of the outputs of the Benchmarking Tool. The fact that each IB programme has different aims (which impact the relationship with interdisciplinarity) means that simple comparison of embeddedness-level judgements between programmes is a blunt tool.
- The IB's structure as an organisation spanning international contexts with different local requirements for IB World Schools means that the organisation itself does not have centralised ability to control embeddedness of *all* aspects of interdisciplinary learning promising practice.
- Some recently updated documentation indicates that the direction of travel within IB resources is that they are embedding promising practice to a higher degree in some areas following the update process and republication.

The Limits of this Study and Avenues for Further Research

The scope, aims, and methods of this study have limits which are helpful to understand because they indicate where further research could build on the findings of this report.

Firstly, the literature which forms the foundation of the Literature Review is a fractured collection of different types of research and practical examples. For instance, there is no literature currently available on large random controlled trials of interdisciplinarity's effectiveness, or large-scale studies of student outcomes stemming from different approaches to interdisciplinarity. Secondly, document audits are the best means of scrutinising the content of educational resources, but cannot fully capture how classroom teaching translates theory into practice, or even the extent to which the advice set-down in documents results in comprehensive and effective understanding of interdisciplinarity on the part of teaching staff with high demands on their time and attention.

Based on these limitations of the study and the findings established by the deployed methodologies, the following areas have emerged as potential avenues for further research:

- Capturing Classroom Experience – Classroom observations and surveys could be used to explore how the theories and structures set-down in IB documentation emerge in practice. Particularly, it would be fruitful to understand how interdisciplinarity

emerges in classroom practices both by design and organically through students transferring their learning or teachers drawing on real-world interdisciplinary contexts.

- Measuring Stakeholder Understanding of Interdisciplinary Learning – Surveys and focus groups could be used to develop a more comprehensive picture of how various stakeholders, such as teachers and other school staff, understand the meaning of interdisciplinarity and related ideas. Particularly, it would be valuable to probe the extent to which stakeholders' career trajectories and experiences of CPD influence their understanding of how to effectively embed interdisciplinary learning.

- Thorough Research into Interdisciplinarity and Assessment Practices – The IB could build on this report by carrying out thorough research into how interdisciplinarity emerges both by design and organically in assessment practices across all four IB programmes. Particularly, it would be valuable to know how frequently interdisciplinary learning emerges in exam responses, coursework, and other formative and summative assessment types. Complex issues worth investigating would include interdisciplinary task design, mark scheme design which rewards interdisciplinarity, and examiner judgements. Due to scope and budget assessment related documents could not be looked at in depth, so results related to assessment practice and interdisciplinarity in the benchmarking should be interpreted cautiously. For example, at the time of this study the IB document: 'Teaching and Learning Informed by Assessment in the DP' was not yet published nor included in the audit work Ecctis conducted. It is worthwhile to revisit the content of this publication and others for further insights about assessment practices and how they relate to interdisciplinarity.

- Exploring Student Outcomes and the Use of Interdisciplinary Learning – Much of the theoretical discussion of how to implement interdisciplinary learning in K-12 education is framed around helping students to be prepared for the real interdisciplinarity of workplace activities, academic research, the true nature of scientific industries, etc. The IB could pursue this link by surveying students who have completed IB programmes and exploring how they have used interdisciplinarity after completing IB programmes. It would be particularly useful to measure the extent to which students feel that interdisciplinary learning in the IB prepared them for interdisciplinarity outside of the school context (e.g. in universities, workplaces, and industries).

1. Introduction

In response to a request for proposals from the International Baccalaureate Organisation (IB), Ecctis has developed a bespoke analysis of the promising practice that can be identified for K-12 interdisciplinary learning and how this compares to current practice in the IB's four programmes: Primary Years Programme (PYP), Middle Years Programme (MYP), Diploma Programme (DP), and Career-Related Programme (CP).

1.1 Context and scope

The study centres on four principal research questions:

Research Questions

Research Question 1: What does the international literature suggest about the effective interdisciplinary education models for ages 6-19?

- 1.1: What are the main drivers and rationales for interdisciplinary education from a pedagogical and epistemological view? What does the international literature suggest about the tension between disciplinary and interdisciplinary learning, teaching and assessment?
- 1.2: What are the models for interdisciplinarity in curricula according to the most recent scientific literature? How do these models differ based on age group?
- 1.3: What does research literature suggest about pre-condition factors that both inhibit or promote effective implementation of interdisciplinarity in integrative curricula and programmes for 6-19 year olds?
- 1.4: What can be said about the relationship between interdisciplinary learning, teaching and assessment? What are the characteristics of good assessment criteria for interdisciplinarity?
- 1.5: What does research literature recommend as effective models, principles and promising practices for promoting interdisciplinarity in integrative curricula and programs? What can be said about the relationship between interdisciplinarity and learner outcomes?

Research Question 2: What effective evidence-based policies, models and promising practices exist at the global level to address/promote/integrate interdisciplinarity in education for students aged 6-19?
- 2.1: Which organizations and national curricula are thought to have effective interdisciplinarity approaches in their curricula?
- 2.2: What types of policies, models and promising practices for integrating interdisciplinarity are promoted by those organisations?
- 2.3: What are the identified high-quality policies, models and practices that can collectively construct a benchmarking tool/reference framework for designing interdisciplinarity into educational programmes?

> **Research Question 3:** **How does IB programmes' interdisciplinarity approach compare with extant research and global promising practices?**
> - 3.1: How is interdisciplinarity addressed in learning, teaching and assessment within and across the IB programmes?
> - 3.2: How do IB programme curricula compare to identified interdisciplinarity policies, models and promising practices (benchmarking/reference framework)?
>
> **Research Question 4:** **What are the policy and practice implications of the collective findings about approaches to interdisciplinary learning from the literature review and curriculum audit for IB?**
> - 4.1: What policy and practice considerations may inform and improve how interdisciplinarity is 'programmed' within and across IB programmes?
> - 4.2: What are potential improvements in IB programme curricula in view of high-quality practices and powerful recommendations for interdisciplinary approaches identified in literature?
> - 4.3. What policy and practice considerations may inform and improve integration of interdisciplinary approaches in teacher support materials, assessment for learning preparations, and PD for IB programmes.

1.2 Structure of Report

In order to effectively answer these four research questions, Ecctis' activities are split into three principal types:
1. Reviewing literature and international examples to ascertain promising practice for embedding interdisciplinary learning,
   - Addressing RQ1 and RQ2;
2. Auditing IB documentation by developing a generalised overview of how the IB embeds interdisciplinary learning into its programmes and deploying a bespoke benchmarking tool to compare IB programmes against identified promising practice,
   - Addressing RQ3;
3. Synthesising the findings to develop conclusions and considerations for the IB as a whole and for individual IB programmes,
   - Addressing RQ4.

Following this introduction, Section 2 will outline the methodologies deployed in the report. That section provides an overview only, with more methodological detail available within subsequent sections where relevant. Section 3 provides a full write-up of the literature review, including a summary of the Elements of Promising Practice (EoPPs) extracted from a combination of academic literature and organisational/national practices. Section 4 details the first part of the auditing process – exploring how interdisciplinarity is embedded into IB resources in a general way, taking into account various different resource types and the overarching curriculum components such as the Learner Profile, Approaches to Teaching, and Approaches to Learning. Section 5 explains how the second document audit element – the benchmarking tool – was constructed; then Section 6 demonstrates the benchmarking tool's application to the IB documentation selected for auditing. Finally, Section 7 provides fully explained conclusions and considerations, with appendices closing the report with additional details in a selection of relevant areas.

1.3 Reading this Report

Due to the nature of the literature review and audit methodologies deployed in this study, the report is necessarily a very long document. This subsection highlights how different stakeholders may wish to read the report in an abbreviated way, in order to efficiently understand the outputs they are personally interested in.

Top-level Overview – Low Detail. For those readers who only wish to see a top-level summary of the report, Ecctis recommends the Executive Summary and the Conclusions and Considerations (Section 7).

Highlights of all Sections – Moderate Detail. For those readers who wish to understand the detail of all findings and outputs but do not wish to read about the design and practice of the methods used, Ecctis recommends: the Executive Summary, the Full List of Elements of Promising Practice (Section 3.12), the red call-out boxes found at the end of every section of the audit (Sections 4 and 6) which summarise those section in bullet points, and the Conclusions and Considerations (Section 7).

Full Report Including Methods Used – High Detail. For those readers to wish to not only understand the findings and outputs but also wish to see how bespoke methods were developed and how literature review and audit techniques were applied, Ecctis recommends the full report with the option of including the appendices for even further methodological detail.

2. Methodology

In response to the research questions put forward by the IB to explore interdisciplinary learning in IB programmes, Ecctis developed a bespoke methodology. An overview of this methodology and a description of each of its constituent parts is provided in this section.

2.1 Overview of the Methodology

This section will provide detailed information on the research design and methodological approaches used to answer the research questions, including the following activities:

- Literature Review
- IB Resources Overview
- Benchmarking Tool
- Development of Conclusions and Considerations.

The figure below provides on overview of how the different elements of Ecctis' bespoke methodology relate to the project's research questions.

Figure 5: Research Questions and Methods Used
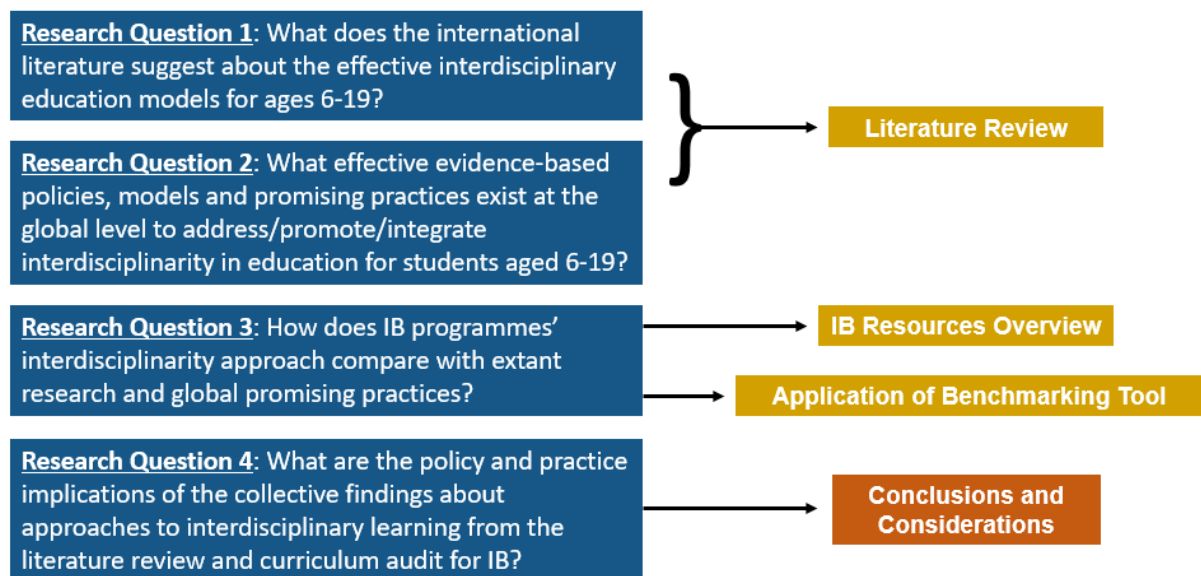
The following figure demonstrates how the different elements of the report link to one-another.

Figure 6: Relationship between Methods Used

Literature Review
Identify "elements" of interdisciplinary learning recognised as promising practice in academic literature and international practice

Creation of Benchmarking Tool

Application of Benchmarking Tool
Judge IB programmes against the "elements of promising practice" identified in the Literature Review

Conclusions and Considerations

IB Resources Overview
Identify an overview of the shape/ structure/ articulation of interdisciplinary learning in IB resources

2.2 Interdisciplinarity and Challenges Facing the IB

At the outset of this project exploring promising practice in interdisciplinary learning and how this relates to current practice in IB programmes, two research activities helped to inform the questions that would be asked in the literature review.

Firstly, two focus groups were carried out in which key members of IB staff were asked, by Ecctis analysts, to share their thoughts on the most pressing issues facing interdisciplinary learning in the IB. Representatives from different IB programmes and different subject areas were assembled in order to gather a range of perspectives. These focus groups were structured around the following question prompts, and participants were then encouraged to engage in wide-ranging discussions about the relationship between interdisciplinary learning and the IB programmes:

1. Do IB programmes have one approach to the interactions between disciplines, or many approaches?
2. What are the biggest challenges facing the delivery of interdisciplinary learning in the IB?
3. What is the IB balance between assessing interdisciplinarity and assessing through disciplines?
4. Has the approach to interdisciplinarity in the IB changed in the past 5 years? 10 years? More?
5. How does interdisciplinary learning fit within the wider pedagogic approaches applied by the IB? Is interdisciplinarity a priority?

We will not discuss the results of these focus groups in detail in this document, and all participants remain anonymous, but the discussions were a valuable contribution to the structuring of the literature review and helped to highlight areas of particular concern or interest, including:

- K-12 progression for interdisciplinarity
- The challenge of assessing interdisciplinary learning
- Definitions of interdisciplinarity.

The second research process which helped Ecctis to develop a structure and foundation for the literature review was careful scrutiny of recent and past projects carried out by the IB (or on the IB's behalf, by external organisations) on themes related to interdisciplinary learning. These reports included (but are not limited to):

- Australian Council for Educational Research. 2019. *The Relationship between Teaching, Learning and Digital Assessment: Literature Review*.
- Horvathova, M. 2019. *Study on Employability Skills in the IB Diploma Programme and Career-Related Programme Curricula*. Centre for Curriculum Redesign.
- International Baccalaureate Organisation. 2019. *The future of interdisciplinary learning and teaching in the DPCP: a roadmap for design and implementation*.
- Medwell, J., Wray, D., Bailey, L., Biddulph, N., Hagger-Vaughan, L., Mills, G., Oliver, M. and Wake, G. 2019. *Concept-based teaching and learning: integration and*

alignment across IB programmes. A report to the International Baccalaureate Organisation. University of Nottingham, School of Education.

- UK NARIC. 2020. *Audit of the International Baccalaureate's Approaches to Teaching*.
- UK NARIC. 2020. *Audit of the International Baccalaureate's Learner Profile*.
- *Review of the IB Diploma Programme: Insights Report*. 2020.

Each of these reports provided different elements of context, which helped to inform either the direction of the literature review or the methodologies and content of the audit. One report that was particularly important in helping to develop a foundation of understanding regarding the particular challenges represented by the IB's embedding of interdisciplinary learning was the *Review of the IB Diploma Programme: Insights Report*. Specifically, the section on interdisciplinarity effectively flags many of the most pertinent challenges faced by the DP programme in relation to interdisciplinary learning. Themes emerging from this included: interdisciplinarity in programme design; strengthening teacher support to foster interdisciplinary learning; integrating interdisciplinarity into assessment; and using an interdisciplinary mindset when implementing the DP. These are important challenges which will all be discussed in the literature review below, however, this report will also look more widely than these challenges because the issues identified in relation to the DP are not likely to be identical for all other IB programmes. This literature review also seeks to take a wider-lens approach to the issues surrounding interdisciplinary learning, allowing the Document Audit and Benchmarking Tool to focus-in more precisely on how this broader picture relates to current IB practice.

Despite the influence of both the focus groups and the past/current reports on helping to shape the most important and relevant questions to consider in the literature review, the guiding methodology was nonetheless of providing a rigorous, independent analysis based on Ecctis' own perspective on the most important themes relating to promising practice in interdisciplinary learning.

2.3 Literature Review Methodology

This literature review primarily aims to answer Research Questions 1 and 2:

Research Question 1: What does the international literature suggest about the effective interdisciplinary education models for ages 6-19?

Research Question 2: What effective evidence-based policies, models and promising practices exist at the global level to address/promote/integrate interdisciplinarity in education for students aged 6-19?

However, in answering those questions, the literature review also establishes the Elements of Promising Practice (EoPPs) which will be used to answer Research Question 3 and therefore feed into the ability to answer Research Question 4:

Research Question 3: How does IB programmes' interdisciplinarity compare with extant research and global promising practices?

Research Question 4: What are the policy and practice implications of the collective findings about approaches to interdisciplinary learning from the literature review and curriculum audit for IB?

As such, the aim of the literature review (expressed as concisely as possible) is to review both academic literature and existing global promising practices in order to identify a collection of promising practice benchmarks. In order to do so effectively and coherently, it was necessary at the outset to identify a series of themes relevant to interdisciplinary learning in general and to the IB's specific implementation of interdisciplinarity. These themes were identified through the focus groups and report analyses described in Section 2.2 (Interdisciplinarity and Challenges Facing the IB) and through a provisional analysis of the evidence available in academic literature and organisational/national practice. Represented visually, the figure below demonstrates the process of developing the literature review.

Figure 7: Literature Review Methodology
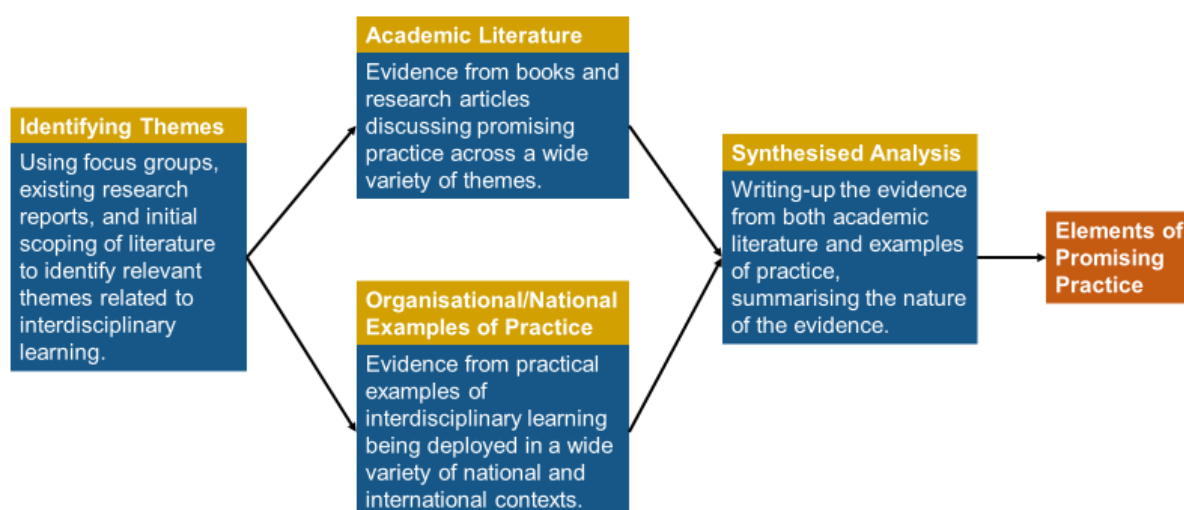
Ecctis used its existing expertise in international education as a foundation from which to develop a list of resources likely to demonstrate aspects of promising practice in the embedding of interdisciplinary learning on the K-12 spectrum. This was supplemented by substantial research into national and organisational practices with public-domain information on models, practices, and policies. Regarding the academic literature, Ecctis analysts developed a list of resources using an organic or "snow-ball" literature review approach. This involves identifying some influential authors writing about the issues surrounding interdisciplinary learning, and then using those texts as starting points to search for further resources which speak to the themes relevant to the literature review. [2]

---

[2] See discussion of selection of initial authors in the introduction of Section 3. Literature Review.

Overall, synthesised analysis was carried out on all selected evidence, from both academic literature and organisational/national practice (where available), using each of the identified themes as subsection dividers. Where sufficient evidence has been accumulated and synthesised for promising practice to be identified in a specific area, this is highlighted in the literature review with a blue text box showing the extraction of an Element of Promising Practice (EoPP).

2.4 IB Resources Overview Methodology

The IB Resources Overview's primary aim is to be part of the answer to Research Question 3:

> **Research Question 3:** How does IB programmes' interdisciplinarity compare with extant research and global promising practices?

In order to effectively answer this question, it is first necessary to establish the nature of "IB programmes' interdisciplinarity". To this end, the IB Resources Overview seeks to understand the broad nature of how the IB's resources might contain reference to interdisciplinary learning. This is not the detailed exploration of specified resources in relation to the Elements of Promising Practice identified in the literature review (that is the purpose of the Benchmarking Tool); instead, the Resources Overview lays the foundation for effective deployment of the Benchmarking Tool by analysing the top-level features of IB resources which have the potential to contribute to the IB's approach to interdisciplinarity.

The different aspects of IB resources examined in section 4 include:
- Cross-programme documents,
- From Principles into Practice documents,
- Subject guides,
- "Core" resources,
- Teacher Support Materials and other resources,
- Curriculum components, including the Learner Profile, Approaches to Teaching, and Approaches to Learning,
- Definitions of "interdisciplinarity" and the family of surrounding terms.

The key question asked by each of these subsections is: how might this component of the IB's resource structure contribute to "IB programmes' interdisciplinarity"? The method used to explore these different resources and resource elements is flexible. For example, when exploring how From Principles into Practice documents might contribute to the IB programmes' interdisciplinarity, these documents will be analysed at a top-level for the type of content they contain and the nature of sections within them which could relate to interdisciplinary learning. On the other hand, when examining the curriculum components such as the Learner Profile, the question of how these relate to interdisciplinarity requires a close analysis of each of their individual elements and the meaning of the language used within their definitions.

The overall intention of the IB Resources Overview is to create an understanding of how the IB's general structure of resources contains different elements which contribute to IB programmes' interdisciplinarity in different ways. Some ways will be programme-specific, or

even only apply to a delimited aspect of a programme, whereas others will have an impact at the cross-programme level.

2.5 Benchmarking Tool Methodology

The Benchmarking Tool emerges out of the literature review and the IB Resources Overview. From the literature review, it lifts all of the Elements of Promising Practice (EoPPs), so that all four IB programmes can be judged for their level of embeddedness of these practices. The Benchmarking Tool builds on the established foundation – from the IB Resources Overview – of how resources are likely to relate to interdisciplinary learning and what cross-programme components contribute to the structure of interdisciplinarity established within programmes.

The Benchmarking Tool is primarily intended to answer Research Question 3, though the findings will also directly feed into Research Question 4:

> **Research Question 3:** How does IB programmes' interdisciplinarity compare with extant research and global promising practices?

> **Research Question 4:** What are the policy and practice implications of the collective findings about approaches to interdisciplinary learning from the literature review and curriculum audit for IB?

The application of the Benchmarking Tool will be structured by the EoPPs, with each of the IB's programmes having a dedicated section to discuss and appraise the relevant evidence for embeddedness of every EoPP. As well as using the insights of the IB Resources Overview to develop each embeddedness judgement, the vast majority of evidence will be drawn from a selection of 32 IB resources jointly chosen by the IB and Ecctis. For full details of which documents were selected and how this choice was made see section 5.2.

Each embeddedness judgement will result in a conclusion of High, Moderate, Low, or No embeddedness for each of the four IB programmes. For a full discussion of how these judgements are made and what criteria feed into the distinction between embeddedness levels see sections 5.3 and 5.4.

The development and application of the Benchmarking Tool is the most methodologically complex element of this report's bespoke approach. As a result, section 5 discusses the methodological choices in full detail. Overall, the Benchmarking Tool is simply a method of appraising how closely IB programmes correspond to the promising practices identified in the literature review.

2.6 Developing Conclusions and Considerations

Following the application of the Benchmarking Tool, all of the evidence accumulated in the report will be digested and synthesised into a number of Conclusions and Considerations. These are intended to answer research question 4:

The Conclusions will summarise the key findings from the report and raise the challenging topics or areas of uncertainly unearthed by the processes of the literature review, IB Resources Overview, and application of the Benchmarking Tool. The Considerations will process the results of the application of the Benchmarking Tool and develop a number of actionable activities which could lead to a higher level of embeddedness of the identified promising practices in IB programmes. Considerations will be provided which apply at the cross-programme level but also at the individual programme (or even individual resource) level where relevant.

2.7 Working with the Results of this Report

This report produces results in a variety of formats and on more than one type of qualitative scale. As a result, this subsection is intended to help guide readers' understanding of how the different types of result can be interpreted. Moreover, this subsection will suggest potential methods for taking the results forward and further exploring the issues raised in the report.

One qualitative measure used in this report is the four types of link – Explicit Link, Strong Implicit Link, Weak Implicit Link, and No Link – used to analyse the presence of interdisciplinary learning in the elements of the Learner Profile (LP), Approaches to Teaching (ATT), and Approaches to Learning (ATL). The full details of that analysis can be found in section 4.8, as part of the IB Resources Overview. Regarding the reading of these results, it is important to note that there is no value judgement surrounding the labels Explicit, Strong Implicit, Weak Implicit or No Link. These designations are designed to accurately capture the extent to which interdisciplinary learning is articulated in those curriculum components, and there is not, therefore, any suggestion that examples of – for instance – Weak Implicit Links, require some form of modification to the curriculum component going forwards. It would not be expected that *all elements* of a student attributes profile, for example, would contain explicit links to interdisciplinary learning. Indeed, a framework that did this would likely fail to provide an adequate diversity of relevant content. The results of that analysis are discussed in section 4.8, but readers should be aware that there is no good-to-bad scale associated with the recognised levels of explicitness. The fact that at least *some level* of implicit and explicit links to interdisciplinary learning were found in those curriculum components was a valuable cross-programme finding for further stages of analysis later in the report.

Another qualitative measure in this report is used to describe the embeddedness of the Elements of Promising Practice (EoPPs) in each of the IB's four programmes. In order to capture the different levels of embeddedness across all 18 EoPPs, the judgements were categorised into High Embeddedness, Moderate Embeddedness, Low Embeddedness, or No Embeddedness. These categories are discussed in more detail in section 5.3. Higher embeddedness judgements correspond to the existence of stronger evidence for the identified promising practice; however, the interpretation of these results should be more nuanced than a simple reading that all EoPPs would ideally have High Embeddedness across the board.

This issue is discussed at more length in section 7.2, but, in simple terms, not all programmes prioritise interdisciplinarity to the same degree, therefore not all programmes should expect the same level of embeddedness for all the identified promising practice. Moreover, the embeddedness of some types of promising practice may be influenced by the IB's structure as an organisation, with World Schools existing in a large number of different national contexts, necessitating a high level of flexibility in some aspects of curriculum design. Both of these issues are discussed at more length in section 7.2, but the key takeaway is that the EoPP judgements need to be read in the context of what programmes aim to achieve and how they are able to articulate evidence of embedding promising practice.

The Conclusions and Considerations (section 7) are intended to provide clear analyses of the findings from the report. The Considerations, in particular, are framed in such a way that they should provide starting points for the IB to develop effective reforms which move resources, programmes, or the entire organisation closer towards the promising practices in identified areas.

Finally, it is important to state that it was not within the scope of this report to provide a full evaluation of each selected IB document regarding their level and methods of embedding interdisciplinary learning and promising practice. Instead, this report focusses on high-level findings and the identification of promising practice. However, in the process of carrying out the auditing for embeddedness of promising practice in the IB programmes, individual documents and resources were examined very closely. Appendix 2 provides selected examples of how individual documents were scoped for evidence that would contribute to the EoPP embeddedness judgements. By including these examples in the appendix, it is not only intended that Ecctis' method is made clear, but also that the IB could use the same methods to move forward from this report and look more closely at individual resources if they choose to do so.

2.8 The Limits of this Study and Avenues for Further Research

The scope and aims of this study have limits which are helpful to understand because they indicate where further research could build on the findings of this report.

The limits of this study include:

Literature Review: The literature which forms the foundation of the Literature Review is a fractured collection of different types of research and practical examples. Random controlled trials of interdisciplinarity's effectiveness and large-scale studies of student outcomes stemming from different approaches to interdisciplinarity are two examples of types of study which are simply not currently available in the literature. The literature base heavily relies on descriptions of small-scale practice or theorisation related to other contexts such as higher education or professional/academic research.

Using Document Audits: Document audits are the best means of scrutinising the content of educational resources, but this does not capture how classroom teaching translates theory into practice, or even the extent to which the advice set-down in documents results in

comprehensive and effective understanding of interdisciplinarity on the part of teaching staff with high demands on their time and attention. Moreover, (due to time constraints) there is necessarily a limit on the number of documents and resources which can be analysed in a document audit. The IB Resources Overview was designed to give an overview of IB documentation, and thereby minimise the impact of this limitation of document audits, however there will always be some resources which are excluded from analysis. In this report, assessment materials fall into this category of resources outside the scope of the study.

Judgements on Levels of Embeddedness: Aspects of the IB Resources Overview rely on making judgements between explicit and implicit references, and the Benchmarking Tool relies on making judgements between High, Moderate, Low, and No embeddedness. Even with detailed explanations of how these judgements have been reached, there will always remain an extent to which such judgements simplify the complex presentation of ideas and concentrate a wide context to make a straightforward classification. For further discussion see the table describing limitations and mitigation strategies in Section 5.3.

Based on these limitations of the study and the findings established by the deployed methodologies, the following areas have emerged as fruitful avenues for further research.

Capturing Classroom Experience – Classroom observations and surveys could be used to explore how the theories and structures set-down in IB documentation emerge in practice. Particularly, it would be fruitful to understand how interdisciplinarity emerges in classroom practices both by design and organically through students transferring their learning or teachers drawing on real-world interdisciplinary contexts.

Measuring Stakeholder Understanding of Interdisciplinary Learning – Surveys and focus groups could be used to develop a more comprehensive picture of how various stakeholders such as teachers and other school staff understand the meaning of interdisciplinarity and related ideas. Particularly, it would be valuable to probe the extent to which stakeholders' career trajectories and experiences of CPD influence their understanding of how to effectively embed interdisciplinary learning.

Thorough Research into Interdisciplinarity and Assessment Practices – The IB could build on this report by carrying out thorough research into how interdisciplinarity emerges both by design and organically in assessment practices across all four IB programmes. Particularly, it would be valuable to know how frequently interdisciplinary learning emerges in exam responses, coursework, and other formative and summative assessment types. This specialized area of focus was largely out of scope in the benchmarking conducted.

Exploring Student Outcomes and the Use of Interdisciplinary Learning – Much of the theoretical discussion of how to implement interdisciplinary learning in K-12 education is framed around helping students to be prepared for the real interdisciplinarity of workplace activities, academic research, the true nature of scientific industries, etc. The IB could pursue this link by surveying students who have completed IB programmes and exploring how they have used interdisciplinarity after completing IB programmes. It would be particularly useful to measure the extent to which students feel that interdisciplinary learning in the IB prepared them for interdisciplinarity outside of the school context (e.g. in universities, workplaces, and industries).

3. Literature Review

Introduction

This literature review has been broken up into 10 sections, each of which addresses the literature and promising practices related to a key theme of interdisciplinary learning. The sections are:

1) Defining Interdisciplinarity
2) The Relationship between Interdisciplinarity and other Pedagogic Ideas
3) The Value and Purpose of Interdisciplinary Learning
4) Effective Pedagogy and Approaches to Interdisciplinary Learning
5) Overcoming Common Challenges to Interdisciplinary Learning
6) Progression and Age-Appropriate Interdisciplinarity
7) Interdisciplinary Skills
8) Assessing Interdisciplinary Learning
9) Interdisciplines, Disciplines, and Disciplinary Knowledge
10) Teacher Support and Collaboration.

These thematic subheadings were developed out of a combination of two activities. Firstly, through exploration of some of the most important and broad academic literature related to interdisciplinary learning. This involved reading and thematically deconstructing the works of some of the most significant contributing authors who have written extensively on this topic, for example: Veronica Boix Mansilla, Julie Thompson Klein, and many others.[3] Secondly, these subheadings were informed by the findings of two focus groups chaired by Ecctis analysts, in which participants (who were IB staff working across multiple programmes, subjects, in curriculum development, and other roles) were asked to describe and discuss some of the most pressing challenges facing interdisciplinarity in the IB.[4] These subheadings were independently written by Ecctis, as a means to thematically break down the larger theme of interdisciplinary learning; the findings from the focus groups were used to ensure that this literature review would be able to address the challenges and questions most pertinent to the IB.

Each of the thematic sections in this literature review will synthesise and describe Elements of Promising Practice (EoPPs), drawing evidence for these EoPPs from both academic literature and organisational and national practices currently being deployed around the world. For further details on this approach and how the EoPPs feed into the subsequent Benchmarking Tool, please see the Methodology, Section 2.6. The conclusion of this literature

---

[3] Significant contributions are defined here by notable achievements or professional standing, extent of publication on the topic of interdisciplinary learning, and citation metrics. For example, Veronica Boix Mansilla is a principal investigator at Project Zero, with significant focus on interdisciplinary learning and a long track record of publication on the topic, including 1,314 citations measured on ResearchGate. Julie Thompson Klein also has an extensive publishing record on many aspects of interdisciplinarity and transdisciplinarity and has received the Kenneth Boulding Award for outstanding contributions to scholarship on interdisciplinarity, as well as 5,952 citations measured on ResearchGate.

[4] For further details on the development and use of these focus groups, see Methodology, Section 2.3.

review will indicate any topics which cannot yet be extracted into EoPPs due to factors such as a shortage of evidence in either academic literature or organisational/national practice.

3.1 Defining Interdisciplinarity

The question of how to define interdisciplinarity is one that has been asked for decades in progressive pedagogy circles, and is likely to continue to be for decades to come. There are many places one could start when attempting to establish the definition of interdisciplinarity, one of which is with a full understanding of what constitutes a "discipline". As we address in Section 3.9 of this literature review (Interdisciplines, Disciplines, and Disciplinary Knowledge), interdisciplinarity is not the opposite or antonym of disciplinarity, but the former undoubtedly springs from the latter.[5] Disciplines, as concepts which separate knowledge or the act of pursuing/constructing knowledge into multiple well-known categories, have histories which can stretch back centuries.[6] Understanding the history of disciplines, and why they exist in their current form, is a vital component of the effort to define interdisciplinarity.[7]

There has already been considerable research carried out identifying and defining interdisciplinarity. UNESCO, for example, in their glossary of curriculum terminology, defines the "interdisciplinary approach" as:

> "An approach to curriculum integration that generates an understanding of themes and ideas that cut across disciplines and of the connections between different disciplines and their relationship to the real world. It normally emphasizes process and meaning rather than product and content by combining contents, theories, methodologies and perspectives from two or more disciplines."[8]

Already, from this one example, it is evident that the definition of interdisciplinarity is likely to lean heavily on other pedagogic terms and ideas with complex and contested definitions. Indeed, Julie Thompson Klein's survey of definitions of interdisciplinarity finds a wide range of

---

[5] Broto, V.C., Gislason, M. and Ehlers, M.H., 2009. Practising interdisciplinarity in the interplay between disciplines: experiences of established researchers. Environmental Science & Policy, 12(7), pp. 922-933.

[6] For a thoughtful definition of "a discipline" see McCulloch, G., 2002. 'Disciplines contributing to education?' Educational studies and the disciplines. British Journal of Educational Studies, 50(1), pp. 100-119, 4. "[Discipline] may be defined, following King and Brownell (1966, p. 68), not simply as an area of study or of knowledge, but as a community of scholars who share a domain of intellectual inquiry or discourse. This commonly involves a shared heritage and tradition, a specialised language or other system of shared symbols, a set of shared concepts, an infrastructure of books, articles and research reports, a system of communication among the membership, and a means of instruction and initiation. It is therefore concerned with teaching as well as research, and with a specific audience or constituency. It is also a dynamic as opposed to a static group, often a coalition of contested views and priorities". Available at: https://discovery.ucl.ac.uk/id/eprint/1568664/1/McCulloch2002Disciplines100.pdf. [Accessed 2/12/2020].

[7] Turner, S., 2000. What are disciplines? And how is interdisciplinarity different. Practising interdisciplinarity, pp. 46-65.

[8] International Bureau of Education. UNESCO. Interdisciplinary approach. Available at: http://www.ibe.unesco.org/en/glossary-curriculum-terminology/i/interdisciplinary-approach.[Accessed 2/12/2020].

"differences in form and definition". Klein points to the array of related concepts including integration, thematic and conceptual approaches, and inquiring beyond the narrower scope of disciplines. [9] As is often the case with abstract nouns and relatively intangible ideas, it can also be useful to approach the definition through metaphors. Prominent amongst those metaphors used to describe interdisciplinarity are bridge building and restructuring. As Klein describes, "bridge building occurs between complete and firm disciplines. Restructuring detaches parts of several disciplines to form a new coherent whole". [10]

Taking all of these definitional difficulties into account, there may come a point for an education provider where it is necessary to settle on a definition while accepting that it is subject to evolution or varying interpretation. However, this section of the literature review will consider the need for a strong definition, how that definition should be developed, what it should include, and how it should be communicated.

At the outset, it is important to establish that academic literature suggests the importance of having a strong definition of interdisciplinarity in an educational context which seeks to foster interdisciplinary learning. Drawing on the lessons learned from the Quebecoise experience of promoting interdisciplinarity as part of the curriculum, Abdelkrim Hasni, Yves Lenoir, and Alessandra Froelich suggest that:

> "In curricula, ministries need to present a clear conception of interdisciplinarity that takes account of the research published in this field over the past decades. It is not sufficient to declare that a curriculum must use interdisciplinarity. The absence of a definition and of explicit justifications for this approach opens the door to any and all interpretations by teachers, leading to problems in their practices. The curriculum must also clearly distinguish between interdisciplinarity and integration, and between their respective functions in teaching-learning processes". [11]

The specific comment about integration will be addressed below, but the central point about the importance of a strong and well-communicated definition is supported by the evidence of interdisciplinarity being practically deployed around the world. For instance, Cambridge International, in their guidance for school leaders in implementing the curriculum, clearly states that "Interdisciplinary understanding is extremely important. It refers to the ability – and confidence – to navigate between disciplines, make connections and develop a holistic appreciation of knowledge that provides new perspectives". [12] Similarly, Education Scotland recognised the significance of a clear definition, and therefore communicated a straightforward yet detailed summary in its documentation:

---

[9] Klein, J.T., 2006. A platform for a shared discourse of interdisciplinary education.

[10] Klein, J.T., 2010. A taxonomy of interdisciplinarity. The Oxford handbook of interdisciplinarity, 15, p. 9.

[11] Hasni, A., Lenoir, Y. and Alessandra, F., 2015. Mandated Interdisciplinarity in Secondary School: The Case of Science, Technology, and Mathematics Teachers in Quebec. Issues in Interdisciplinary Studies, 33, pp.144-180. p. 175.

[12] Cambridge Assessment International Education. 2020. Implementing the Curriculum with Cambridge A guide for school leaders. p. 44.Available at: https://www.cambridgeinternational.org/Images/134557-implementing-the-curriculum-with-cambridge.pdf. [Accessed 2/12/2020].

"**Interdisciplinary Learning** is a planned experience that brings disciplines together in one coherent programme or project. The different disciplines plan and execute as one. These disciplines might fall within one curricular area (e.g. languages, the sciences) or between several curricular areas. **IDL** enables children and young people to

● learn new knowledge or skills, and develop new understanding of concepts;
● draw on prior knowledge, understanding and skills;
● transfer and apply that collective knowledge to new problems or other areas of learning.

This is different from learning, for example, which takes place when several disciplines or subjects are linked up through a common theme or topic, but the student's experience and educator planning is discreet, or separate in each discipline or subject. This can be referred to as **multi-disciplinary learning**".[13]

Following this description, the document in question then proceeds to deploy a tick-based table which demonstrates which features of interdisciplinary learning and multi-disciplinary learning are shared, and which are unique features of each. The differences between these terms will be discussed later in this section.

Overall, the evidence from both organisational examples and academic literature suggests that a strong and coherent articulation of the definition of interdisciplinarity is likely to be highly important in the development of successful interdisciplinary learning.

As Hasni *et al* commented, in response to the regional policy in Quebec, the definition of interdisciplinary learning should be informed by the research that has taken place in the academic field in recent decades. However, given the vibrant debate over the meaning of interdisciplinarity – or "the lack of consensus in the definition and understanding of interdisciplinarity" – what elements should inform that definition?[14] A detailed analysis of this question by Veronica Boix Mansilla and Elizabeth Dawes Duraising resulted in the definition of "interdisciplinary understanding as the capacity to integrate knowledge and modes of thinking in two or more disciplines or established areas of expertise to produce a cognitive advancement – such as explaining a phenomenon, solving a problem, or creating a product – in ways that would have been impossible or unlikely through single disciplinary means".[15] On balance, this definition, which prioritises the production and use of knowledge over the accumulation of it, sits effectively within the constructivist pedagogic frame that best accompanies interdisciplinary learning (see Section 3.2, The Relationship between Interdisciplinarity and other Pedagogic Ideas).

The Boix Mansilla and Dawes Duraising definition also points us to the fact that there are different types of interdisciplinary learning with different priorities in relation to the

---

[13] Education Scotland. 2020. Interdisciplinary Learning: ambitious learning for an increasingly complex world. Available at: https://education.gov.scot/media/mkomulen/interdisciplinary-learning-thought-paper.pdf [Assessed 2/12/2020].
[14] Hasni *et al.* pp.144-180
[15] Mansilla, V.B. and Duraising, E.D., 2007. Targeted assessment of students' interdisciplinary work: An empirically grounded framework proposed. The Journal of Higher Education, 78(2), pp. 219.

development, use, and acquisition of knowledge or understanding. Klein discusses various forms of interdisciplinarity – including Methodical Interdisciplinarity, Theoretical Interdisciplinarity, Instrumental Interdisciplinarity, Critical Interdisciplinarity – and we have already encountered the differences entailed in the metaphors of both bridge building and restructuring. Rather than running through potential definitions of each of these, the key takeaway point perhaps is that interdisciplinarity is not a single phenomenon but rather a movable concept, in which the intended purpose should inform the shape of its definition. On the practical level of developing a definition for communication to teaching and school staff, the intricate differences between these types of interdisciplinarity are unlikely to feature. However, establishing the specific purpose of interdisciplinary learning is an important part of developing a coherent and useful definition. For more details on the purpose of interdisciplinarity, see Section 3.3, The Value and Purpose of Interdisciplinary Learning.

Element of Promising Practice 1: To deliver a coherent, research-informed definition of interdisciplinary learning, which is guided by the intended purpose of deploying interdisciplinarity – A definition of interdisciplinarity or interdisciplinary learning should be clearly expressed, coherent across all documentation that may be encountered by stakeholders, and should be based on research into interdisciplinary learning which has taken place in recent decades. There are many different possible aims and purposes behind the deployment of interdisciplinary learning, so the definition should reflect an active engagement with the chosen and intended purpose. The definition should ideally be found in an easy-to-locate resource (such as a glossary) but should also be coherent when referenced or developed in other locations within documentation.

As the Education Scotland example above indicated, key to defining interdisciplinarity is clarifying the differences and overlaps between interdisciplinarity, multidisciplinarity, transdisciplinarity, and other related terms. The most common means of differentiating between multidisciplinarity and transdisciplinarity is, as Seongsook Choi and Keith Richards describe, that multidisciplinarity "draws on different disciplinary perspectives, but each discipline maintains its own distinct identity and no attempt at integration is made".[16] On the other hand, transdisciplinarity is typically being viewed as far more integrative than interdisciplinarity. Thus, in a significantly over-simplified manner, these three ideas could be represented with the following diagram:

Figure 8: Levels of Integration and the Family of Terms related to Interdisciplinarity

Multidisciplinarity   Interdisciplinarity   Transdisciplinarity

Integration

Lesser Extent   Greater Extent

---
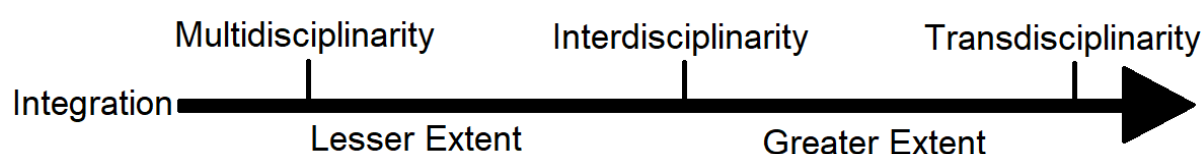
[16] Choi, S. and Richards, K., 2017. Interdisciplinary discourse: Communicating across disciplines. Springer. p. 51.

The most effective way to differentiate between these terms is debatable, because their individual definitions do vary substantially. However, the importance of engaging with this difference and communicating it clearly is underscored by a wide array of academic literature. [17]

The issue of integration is an important one to handle effectively in the definition of interdisciplinarity. As Allen F. Repko has discussed extensively, there are some authors writing on the topic of interdisciplinarity who do not see integration as a key component of that idea (viewing interdisciplinarity as closer to multidisciplinarity in the simple diagram above). However, Repko concludes that those views have been overtaken by the evidence, and that "today there is no justification grounded in either theory or practice for excluding integration from conceptions of interdisciplinarity". [18] As Lyn D. English has pointed out in reference to STEM integration in the K-12 context, though, it is not enough to simply say that integration is a part of interdisciplinary learning; the manner in which subjects can be integrated and balanced in an appropriate way needs to be taken into account. This is an area where more research is needed. As English suggests, "we still need more studies on how student learning outcomes arise not only from different forms of STEM integration but also from the particular disciplines that are being integrated". [19] This is just one example, but integration can involve a number of different types of disciplinary boundary crossing and mixing. It is important to engage with this complexity and the nature of the integration desired by interdisciplinary learning when building a useful and coherent definition. [20]

> **Element of Promising Practice 2**: To engage clearly and coherently with the differences and similarities between interdisciplinarity and other related terms such as multidisciplinarity and transdisciplinarity – Although there is not one fixed definition of terms such as interdisciplinarity, multidisciplinarity, and transdisciplinarity, there should be clear engagement with the overlaps and distinctions between the meanings of such ideas. This might be achieved by offering individual definitions of each term, or it may be appropriate to provide a lengthier discussion around the issue of integration and how this may differentiate between such notions. These terms should not be used interchangeably within resources, as this has high potential to lead to confusion for stakeholders.

[17] See also, Lenoir, Y., Hasni, A., Lenoir, Y. and Klein, J.T., 2010. Interdisciplinarity in Quebec schools: 40 years of problematic implementation. Issues in Interdisciplinary Studies.; Broto *et al* pp. 922-933.; Helmane, I. and Briška, I., 2017. What is developing integrated or interdisciplinary or multidisciplinary or transdisciplinary education in school?. Signum Temporis, 9(1), p. 7.; Klein, pp. 15-30.
[18] Repko, A., Navakas, F. and Fiscella, J., 2007. Integrating interdisciplinarity: How the theories of common ground and cognitive interdisciplinarity are informing the debate on interdisciplinary integration. Issues in Interdisciplinary Studies. p. 25.
[19] English, L.D., 2016. STEM education K-12: Perspectives on integration. International Journal of STEM education, 3(1), p. 1.
[20] For more details on the spectrums of integration and interdisciplinarity, see Demirel, M. and Coşkun, Y.D., 2010. Case study on interdisciplinary teaching approach supported by project based learning. The International Journal of Research in Teacher Education, 2(3), pp. 28-53.

Overall, the definition of interdisciplinarity will be something that continues to be contested, whether along the lines of the extent of subject integration involved, or another variable such as purpose. The evidence found in this literature review suggests that there are certain key qualities that a strong definition must include, such as differences with neighbouring terms, link to the intended purpose of interdisciplinary learning, and relationship to integration. Other key processes that must inform the construction of the definition may not need to be articulated in the definition itself though, such as being informed by recent research into the variety within interdisciplinarity. Perhaps most importantly, the definition of interdisciplinary learning should be coherent and strongly communicated, clearly flagged as a definition that can be applied across the curriculum.

3.2 The Relationship between Interdisciplinarity and other Pedagogic Ideas

As touched upon in the previous section, interdisciplinary learning is inevitably linked to other aspects of progressive pedagogy. Indeed, it is rare to find interdisciplinary learning defined without a link being drawn to one or more pedagogic notions such as collaboration, authentic learning, student-led inquiry, and many others. Broadly speaking, evidence from academic literature suggests that interdisciplinary learning falls within the wider umbrella of constructivist pedagogy. Boix Mansilla has suggested that "Pragmatic Constructionism" is the appropriate epistemological frame within which interdisciplinary learning is placed.[21] The meaning of this is two-fold: constructionism, in that the construction of understanding is prioritised over the acquisition or accumulation of knowledge; and pragmatic, in the sense that interdisciplinary learning should be done not just for its own sake but to achieve some goal (such as gaining an insight not achievable through the lens of fully separate disciplines). On this point, Klein agrees with Boix Mansilla. The former explains that "interdisciplinary education at all levels intersects with innovative pedagogies that emphasize exploration and active involvement in the process of making meaning. Teachers use innovative approaches that promote dialogue and community, problem-posing and problem-solving, and critical thinking".[22] Although the words "constructionism" or "constructivist" do not appear in Klein's description, it is clear that this process-driven, exploratory, and student-centred style of teaching and learning echoes Boix Mansilla's sentiment.

Interdisciplinary learning's relationship with student-centred learning is among the most common themes to emerge in pedagogic literature on this topic. There are multiple small-scale studies related to different age groups and different learning topics which suggest that interdisciplinarity fosters (or, in promising practice examples, it *should* foster) students' ability to make their own connections between learning areas. Individually, these studies are not conclusive evidence, but the tide of small studies can reasonably be taken to be indicative of a wider trend. For example, Tsourlidaki Eleftheria, Sofoklis Stirou and Rosa Doran have drawn this link in relation to the teaching of big scientific ideas at the primary and secondary level. Kelly Byrne Bull and Juliann B. Dupuis have explored a similar idea in the context of using nonfiction in the teaching of English and biology. In STEM education, Kelly C. Margot and

---

[21] Mansilla, V.B., 2016. Interdisciplinary learning: A cognitive-epistemological foundation. p. 7.
[22] Klein, p. 10-18.

Todd Kettler have argued that "teachers have to become comfortable allowing their students to 'take the wheel' and drive instruction". Göran Brante and Albina Brunosson, in the context of blurring mathematics with home economics in a study on Swedish 12-year-olds, concluded that effective interdisciplinarity should be driven by a recognition of students' needs and interests.[23] Moreover, as Jamie Smith and P. J. Karr-Kidwell have discussed, student-centred teaching in the context of interdisciplinarity can also blend into inclusion of parents, enabling them to help guide or scaffold learning around the interests of students.[24] Indeed, it is important to note that student-centred interdisciplinary learning does not mean leaving students entirely to their own devices; there is an important role for strategic and intelligent scaffolding by teachers too. Melissa Warr and Richard E. West reached this conclusion in their study of how to bridge academic disciplines in an interdisciplinary design studio setting. Although the study took place in a higher education context, the same pedagogic implications stand for the K-12 age range too. Warr and West found that although student-centred learning was vital to the success of interdisciplinary projects, "the challenges students described suggest additional support and scaffolding, particularly as it applies to supporting disciplinary thinking and learning, might allow for a more successful experience".[25] It is therefore evident that student-centred pedagogy should be intricately connected to interdisciplinary learning, but as with all student-led approaches, these can also stretch beyond the student themselves (to family, for example), and should be viewed as part of a broader approach to scaffolded learning.

The student-centred pedagogical approach is embedded within the design, teaching framework, and support materials of a number of interdisciplinary-focused qualifications. The skills-based Cambridge Global Perspectives programme, for example, not only includes programme aims but also sets out the assessment objectives in terms of key skills students are expected to develop and be assessed on throughout the programme. This serves to position student development at the heart of the interdisciplinary programme. The Pearson Extended Project Qualification has also been developed to be outcomes-based, with teacher support materials integrating student-led activities.[26] Students select research questions of personal interest, based around topics and knowledge acquired from across different subject areas. This approach to interdisciplinary learning is designed to facilitate engagement and to develop personalised learning outcomes for each student, whilst scaffolding in the form of structured support is provided to teachers delivering and supervising projects.

[23] Eleftheria, T., Sotiriou, S. and Doran, R., 2016. The "Big Ideas of Science" for the school classroom: Promoting interdisciplinary activities and the interconnection of the science subjects taught in primary and secondary education. Journal of Research in STEM Education, 2(2), pp. 72-89; Bull, K.B. and Dupuis, J.B., 2014. Nonfiction and interdisciplinary inquiry: Multimodal learning in English and biology. English Journal, pp. 73-79; Margot, K.C. and Kettler, T., 2019. Teachers' perception of STEM integration and education: a systematic literature review. International Journal of STEM Education, 6(1), p. 14; Brante, G. and Brunosson, A., 2014. To double a recipe–interdisciplinary teaching and learning of mathematical content knowledge in a home economics setting. Education Inquiry, 5(2), pp. 301-318.
[24] Smith, J. and Karr-Kidwell, P.J., 2000. The Interdisciplinary Curriculum: A Literary Review and a Manual for Administrators and Teachers. pp. 12, 18, 21.
[25] Warr, M. and West, R.E., 2020. Bridging Academic Disciplines with Interdisciplinary Project-based Learning. Interdisciplinary Journal of Problem-Based Learning, 14(1). p. 14.
[26] Pearson Qualifications. 2019. Pearson Edexcel Level 3 Extended Project. Available at: https://qualifications.pearson.com/en/qualifications/edexcel-project-qualification/level-3.html. [Accessed 2/12/2020].

> **Element of Promising Practice 3**: To ensure a significant level of teacher scaffolding to help students deploy disciplines and interdisciplinarity effectively – Whilst interdisciplinarity should enable student-led inquiry, it is essential that student-led interdisciplinary inquiry is intelligently scaffolded by teachers. For example, by strategically developing "hooks" in one subject that can be activated in others, or by carefully explaining how students are carrying out interdisciplinary work through the use of disciplinary knowledge.

The use of concepts in teaching and learning is another key element of the wider constructivist pedagogy and is frequently linked to interdisciplinary learning in the academic literature. On the simplest level, the use of a concept rather than subject-specific knowledge enables fluid movement for students between disciplines. As Sonja Andersson *et al* describe using the language of themes (though the same can be said for concepts) "an interdisciplinarity approach, which uses a theme as an organizing or integrating element, can show how different disciplines interrelate in the elaboration and illumination of the theme".[27] Moreover, concepts can be used throughout the learning cycle, as Nandu C. Nair *et al* argue in relation to the assessment of conceptual understanding – more information regarding this is included in Section 3.8, Assessing Interdisciplinary Learning.[28] The academic literature also suggests that the use of concepts to facilitate and strengthen interdisciplinary learning is appropriate across all parts of the K-12 age range. Maria Birbili, for instance, makes a strong case for early childhood conceptual education, as "planning learning experiences by key concepts and ideas establishes conceptual links between different curriculum areas".[29] In research applying to a later point in the school-age spectrum, Barbara Nagle has presented evidence about how secondary-level biology instruction should be framed in order to prepare students for the interdisciplinary nature of the modern field of biology. Nagle argues that teaching should not just use snippets of interdisciplinary examples, "instead, interdisciplinary concepts should be more deeply woven into instruction and integrated by explicit consideration of cross-cutting themes, such as scale, structure, and function".[30] It is also important to note that not all concepts function the same way and for the same purposes in relation to interdisciplinary learning. In their work on conceptual understanding, Julie Stern, Krista Ferraro, and Juliet Mohnkern explain the differences between macroconcepts – which facilitate movement between disciplines – and microconcepts which enable deep understanding within disciplines.[31] Despite such complexities regarding exactly what concepts are, and precisely how to use them, the literature on this topic suggests that they should be an integral part of interdisciplinary learning.

---

[27] Andersson, S., Bergstrom-Nyberg, S., Dumbrajs, M., Dumbrajs, S., Martelin, V., and Westerlund, T., 2010. Interdisciplinary Education in Comprehensive School: Can a Deep Understanding Occur?. Online Submission, 7(9), p. 45.

[28] Nair, N.C., Archana, J.S., Chatterjee, S. and Bijlani, K., 2015, August. Knowledge representation and assessment using concept based learning. In 2015 International Conference on Advances in Computing, Communications and Informatics (ICACCI) (pp. 848-854). IEEE.

[29] Birbili, M., 2007. Making the case for a conceptually based curriculum in early childhood education. Early Childhood Education Journal, 35(2), pp.141-147. p. 142.

[30] Nagle, B., 2013. Preparing high school students for the interdisciplinary nature of modern biology. CBE—Life Sciences Education, 12(2), p. 144.

[31] Stern, J., Ferraro, K., and Mohnkern, J., 2017. Tools for teaching conceptual understanding, secondary: Designing lessons and assessments for deep learning. Corwin Press. p. 13.

In the global K-12 education context, the Cambridge Global Perspectives and Research programme reflects the integration of concepts across the learning cycle as a pedagogical approach to interdisciplinarity. Key concepts are defined as "essential ideas, theories, principles or mental tools that help learners to develop a deep understanding of their subject and make links between the different topics".[32] As reflected in the academic literature, key concepts facilitate and strengthen interdisciplinary learning in the programme. Likewise, integration of concepts is supported by the exploration of "global themes" as a key organising principle of the Cambridge Global Perspectives programme.

Collaboration is another piece in the constructivist education jigsaw that is frequently mentioned in the same breath as interdisciplinary learning. To provide just one example, Stephanie V. Bestelmeyer *et al* – in their discussion of what is needed in K-12 ecology education in order to meet the modern and global challenges faced by that discipline – argue that interdisciplinary science teaching should encompass "collaboration practices" and the ability to "communicate effectively with people outside of the field". Indeed, the key for ecology education going forward, according to these authors, is that "ecologists, and those working at the interface of ecology and K–12 education, must take the lead by implementing projects that encourage authentic ecological research while promoting collaboration, interdisciplinary thinking, and communication".[33] This is only one example, but it is representative of a wider pattern of linking the goals of interdisciplinary learning to the skills of collaboration and effective communication. Elsewhere in the academic literature, the collaboration described in relation to interdisciplinarity also relates to teacher-teacher collaboration. Carrer *et al*, for example, in their analysis of interdisciplinary elementary science and music curriculum development, suggest that "the implementation of innovative and interdisciplinary curriculum in elementary school is a collaborative process" involving all school staff communicating effectively with the same goals.[34] This issue will be discussed extensively in Section 3.10, Teacher Support and Collaboration. It is nonetheless evident that collaboration and interdisciplinary learning are intrinsically linked, and effective communication strategies should be built into strategies for developing interdisciplinary learning across the K-12 spectrum.

Collaboration is, for example, a key step within the "critical path", a pedagogical approach in the Cambridge Global Perspectives interdisciplinary programme used to develop the student's ability to think critically. As an outcome of the programme, students are expected to develop the ability to "communicate views, information and research effectively and convincingly".[35]

---

[32] Cambridge Assessment International Education. 2020. SYLLABUS: Cambridge International AS & A Level Global Perspectives & Research 9239. Available at: https://www.cambridgeinternational.org/Images/414971-2020-2021-syllabus.pdf. [Accessed 2/12/2020]

[33] Bestelmeyer, S.V., Elser, M.M., Spellman, K.V., Sparrow, E.B., Haan-Amato, S.S. and Keener, A., 2015. Collaboration, interdisciplinary thinking, and communication: new approaches to K–12 ecology education. Frontiers in Ecology and the Environment, 13(1), p. 42.

[34] Carrier, S., Wiebe, E.N., Gray, P. and Teachout, D., 2011. BioMusic in the classroom: Interdisciplinary elementary science and music curriculum development. School Science and Mathematics, 111(8), p. 432.

[35] Cambridge Assessment International Education. 2020. SYLLABUS: Cambridge International AS & A Level Global Perspectives & Research 9239, p. 15. Available at: https://www.cambridgeinternational.org/Images/414971-2020-2021-syllabus.pdf. [Accessed 2/12/2020].

Collaboration and communication build on the deconstruction, reconstruction and reflection critical path stages whereby the student explores information and different perspectives, and communicates personal findings using a variety of means. Acknowledging that Global Perspectives is intended to be a skills-based programme, the use of collaboration in developing knowledge and understanding of global themes and issues strongly reflects the views expressed in academic literature that interdisciplinary learning should be a collaborative process.

Authors on this topic are clear that effective inquiry-based learning is likely to be interdisciplinary, and effective interdisciplinary learning is likely to facilitate inquiry-based approaches. [36] The intricate interweaving of these two elements of pedagogy are represented by the way they are bound together in notions such as Interdisciplinary Science Inquiry (ISI), an approach argued by Vanashri Nargund-Joshi and Xiufeng Liu to hold value for the entire K-12 age range. [37] Inquiry-based approaches also have a natural affinity with student-centred teaching and learning (as discussed above), and interdisciplinary learning dovetails effectively with this pedagogy, as interdisciplinary student-led inquiry enables students to build their own organic connections between disciplines. [38] Though, of course, student-centred does not mean teacher-free, as teaching should strategically plant "hooks" in one subject that can be activated by student-led inquiry in another, as argued by Byrne Bull and Dupuis. [39] Boix Mansilla, too, indicates that interdisciplinary inquiry is part of the wider progressive view of constructivist epistemology in K-12 education. She argues that:

> "By broadening the admissible sources of knowledge and inquiry beyond strictly certified propositions, this pluralist epistemology invites the inclusion of other symbol systems (visual, musical, kinesthetic) and ways of knowing such as artistic interpretations or literary fictions, including a learners' naïve or indigenous beliefs. Interdisciplinary understanding can thus be viewed as a "system of thought in reflective equilibrium"— a complex and dynamic set of connections and mental representations that embody insights and tensions across disciplines, represent an improvement over prior beliefs, and remain open for review". [40]

The vision here is of interdisciplinarity opening up inquiry beyond the knowledge boundaries of a curriculum following the strict tramlines of traditional disciplines.

Finally, the pedagogic literature which states that K-12 teaching should use authentic, real-world contexts for learning also shows that interdisciplinarity should be part of that authenticity. As Brante and Brunosson discuss at length, authentic problems that students might encounter in the real world and outside of school naturally prompt them to see that knowledge and challenges stretch beyond the boundaries of single disciplines. [41] Indeed, Nagle has argued

---

[36] Rennie, L.J., Venville, G. and Wallace, J., 2011. Learning science in an integrated classroom: Finding balance through theoretical triangulation. Journal of Curriculum Studies, 43(2), pp. 139-162.
[37] Nargund-Joshi, V., Liu, X., Chowdhary, B., Grant, B. and Smith, E., 2013, April. Understanding meanings of interdisciplinary science inquiry in an era of next generation science standards. In annual meeting of National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
[38] Eleftheria *et al*, pp. 72-89.
[39] Bull and Dupuis, pp. 73-79.
[40] Boix Mansilla, p. 8.
[41] Brante and Brunosson.

that it is the deployment of something like biology in "meaningful situations" that will truly prepare students for the way that science functions today. Al Salami *et al* suggest that authenticity generally involves crossing between disciplines either in knowledge-content or the methodology of constructing understanding.[42] Moreover, Bestelmeyer *et al* have suggested that effective preparation for further/higher education or for industry and the world of work should deploy interdisciplinarity that uses authentic contexts.[43] This can also help to bring students' interests and experiences into subjects that traditionally fail to engage some pupils. For instance, the Spanish school photography competition that asked students to find visual examples of mathematics in the real world shows one successful example of interdisciplinarity and authentic contexts being deployed together.[44] Moreover, as Daisy Rooks and Celia Winkler have discussed, authentic interdisciplinary learning not only enables students to see outside of a discipline, but also to recognise that real problems require perspectives from beyond a single culture. There is, therefore, also a strong link between interdisciplinarity and the development of international perspectives in relation to real and global issues.[45] Overall, the evidence from academic literature clearly shows that interdisciplinary learning should make use of authentic contexts wherever possible, to maximise student engagement.

In the upper-secondary context, project-based and research-based qualifications also aim to develop effective inquiry-based approaches, which are directly linked to an overall interdisciplinary focus – thus showing practical implementation of the practices suggested by Bestelmeyer *et al*. The Cambridge Global Perspectives and Research A-Level programme, for instance, provides an opportunity for students to conduct an extended piece of research on an academic topic of their own choice, engaging their own personal interests. Through inquiry-based approaches, teachers delivering the programme develop students' ability to use research to support judgements about arguments and perspectives, which integrate interdisciplinary themes and ideas. Furthermore, extended project qualifications offered by Cambridge and Pearson respectively engage students in project-based learning, a process which can integrate subject knowledge and skills from across disciplines (for more on project- and problem-based approaches see Section 3.4 of this literature review). The pedagogical approach, for instance, includes a skills development phase where students learn to engage in paired debates, interrogating arguments and sources, thereby building inquiry skills required to undertake an extended project (for more on interdisciplinarity and skills, see Section 3.7 of this report).[46]

Equally, the development of global-mindedness and an international perspective is integral not only to the Cambridge Global Perspective programme but also other globally oriented awards such as the College Board AP Seminar (taught as part of the AP Capstone) and is

---

[42] Nagle. p. 144; Al Salami, M.K., Makela, C.J. and de Miranda, M.A., 2017. Assessing changes in teachers' attitudes toward interdisciplinary STEM teaching. International Journal of Technology and Design Education, 27(1), pp. 63-88.

[43] Bestelmeyer *et al*, pp. 37-43.

[44] Segovia, I., Lupiáñez, J.L., Molina, M., Lenoir, Y. and Klein, J.T., 2010. The conception and role of interdisciplinarity in the Spanish education system. Issues in Interdisciplinary Studies.

[45] Rooks, D. and Winkler, C., 2012. Learning interdisciplinarity: Service learning and the promise of interdisciplinary teaching. Teaching Sociology, 40(1), p. 3.

[46] Pearson Qualifications. Edexcel Extended Project. Available at: https://qualifications.pearson.com/content/dam/pdf/Project-Qualification/Level-3/2010/Teaching-and-learning-materials/Extended-Project-Casestudy.pdf [Accessed 2/12/2020].

connected explicitly to an interdisciplinary approach to learning. [47] Reflecting Rooks and Winkler's conception of effective interdisciplinary learning as integrating international perspectives, these programmes aim to expand the student's appreciation of real-world problems beyond one culture, where the connection between local issues and global themes are explored through a cultural lens.

> **Element of Promising Practice 4**: To explicitly link interdisciplinary learning with other features of constructivist pedagogy, including concept-based teaching, student-led inquiry, collaboration, and authentic learning – At the level of stated aims and methods of teaching and learning, interdisciplinary learning should be explicitly described as part of a wider spectrum of progressive constructivist pedagogy. The ideas to link with interdisciplinarity include conceptual understanding, student-centred learning, inquiry, collaboration, learning structured around authentic and real-world issues, and awareness of other perspectives and cultures. It is important to link these pedagogic approaches at multiple levels, but this Element of Promising Practice focuses at the top level of the stated headline aims and approaches to teaching and learning.

To conclude, it is clear that the relationship between interdisciplinary learning and numerous other elements of constructivist pedagogy is discussed extensively in both theoretical studies and case-study driven research. Those pedagogic approaches which should be deployed alongside and as part of interdisciplinary learning include student-centred learning, concept-based teaching, collaborative practices, inquiry, and the use of authentic, real-world contexts.

3.3 The Value and Purpose of Interdisciplinary Learning

The value of interdisciplinary learning across the K-12 continuum is recognised by a wide range of institutions and academic work. Delma Deneme and Selen Ada point out the value at primary school age, Barbara St. Clair and David L. Hough at middle-school age, and Aharon Gero and Kelly M. Winkelhake at upper secondary or high-school level. [48] However, it should also be pointed out that Winkelhake and St. Clair and Hough, in particular, also note that empirical evidence is rare for large-scale research that proves benefits against a control group. Nonetheless, that threshold of evidence is difficult to obtain in a K-12 education environment, so the theoretical works, small-scale case-studies, and evidence of practical deployment must be stitched together to find consensus and promising practice where available. Not all

---

[47] AP Board. 2020. AP Seminar. Course and Exam Description. Available at: https://apcentral.collegeboard.org/pdf/ap-seminar-course-and-exam-description.pdf?course=about-ap-capstone-diploma-program. [Accessed 2/12/2020].
[48] Deneme, S. and Ada, S., 2012. On applying the interdisciplinary approach in primary schools. Procedia-Social and Behavioral Sciences, 46, pp. 885-889; St Clair, B. and Hough, D.L., 1992. Interdisciplinary Teaching: A Review of the Literature; Gero, A. and Zach, E., 2014. High school programme in electro-optics: A case study on interdisciplinary learning and systems thinking. International Journal of Engineering Education, 30(5), pp.1190-1199; Winkelhake, K.M., 2015. Case study exploring the use of an interdisciplinary approach to teach a high school mathematics and science topic. Northeastern University.

academic works push for the value of interdisciplinary learning, but purposeful and well-designed interdisciplinary learning is presented as valuable by the vast majority of sources consulted for this literature review.[49] This section examines not only what the perceived value of effective interdisciplinary learning is, but also considers the significance of the different purposes assigned to interdisciplinary learning, and the importance of students, teachers, and other stakeholders understanding the purpose and value of interdisciplinarity.

Taking into account the entirety of Section 3.2 – The Relationship between Interdisciplinarity and other Pedagogic Ideas – one value of interdisciplinary learning is that it facilitates other important elements of constructivist pedagogy, which should be delivered cohesively if possible. For instance, Jenneth Parker discusses the broad consensus in the literature concerning the benefits of the interaction between interdisciplinarity and student-led, process-driven learning.[50] Hye Sun You has also pointed out that enabling students to work between multiple disciplines helps them to "make connections and generate meaningful associations" – thus developing the positive outputs of constructivist pedagogy such as student-led authentic inquiry.[51] Moreover, in the Colombian context, José Gregorio Rodríguez and Carlos Miñana Blasco have put forward evidence to suggest that interdisciplinary projects can effectively build issues of local concern into education programmes – thus adding another layer of authenticity and student interest.[52] Therefore, one value of interdisciplinary learning is that it supports the rest of the constructivist pedagogic approach.

Besides the ability to enable other valuable aspects of pedagogy, there are also some studies and research papers which suggest specific desirable outcomes for learners who have experienced interdisciplinary learning. For instance, it is interesting to note that Katharina Spintzyk *et al* argue for the existence of some empirical evidence of knowledge and understanding benefits from interdisciplinary learning as compared to learning through single disciplines, and Jennifer Richards *et al* also found similar benefits from another small-scale study.[53] Boix Mansilla has also suggested that interdisciplinary learning has the desired outcome of effective use of prior knowledge. Warr and West, as well as St. Clair and Hough, draw a close link between deployment of interdisciplinary learning and student engagement, motivation, and enjoyment. Moreover, Bestelmeyer *et al* also underscore the fact that interdisciplinary learning better prepares students for future study or career pathways because interdisciplinarity more accurately represents the real practice of carrying out work in fields such as ecology (or wider STEM, as argued by Hye Sun You).[54]

---

[49] For an academic article pushing for knowledge and disciplinary curricula rather than understanding and thematic curricula, see Young, M., 2010. The future of education in a knowledge society: The radical case for a subject-based curriculum. Journal of the Pacific Circle Consortium for Education, 22(1), pp. 21-32.

[50] Fadeeva, Z., Mochizuki, Y. and Parker, J., 2010. Competencies for interdisciplinarity in higher education. International Journal of Sustainability in Higher Education.

[51] You, H.S., 2017. Why Teach Science with an Interdisciplinary Approach: History, Trends, and Conceptual Frameworks. Journal of Education and Learning, 6(4), pp. 66.

[52] Rodríguez, J.G., Blasco, C.M., Lenoir, Y. and Klein, J.T., 2010. Interdisciplinarity and research on local issues in schools: Policies and experiences from Colombia. Issues in Interdisciplinary Studies.

[53] Spintzyk, K., Strehlke, F., Ohlberger, S., Gröben, B. and Wegner, C., 2016. An Empirical Study Investigating Interdisciplinary Teaching of Biology and Physical Education. Science Educator, 25(1), pp. 35-42.; Richards, J., Skolits, G., Burney, J., Pedigo, A. and Draughon, F.A., 2008. Validation of an interdisciplinary food safety curriculum targeted at middle school students and correlated to state educational standards. Journal of Food Science Education, 7(3), pp. 54-61.

[54] Bestelmeyer *et al*, pp. 37-43; You, p. 66-77.

> **Element of Promising Practice 5**: To clearly articulate and communicate, to staff and students, the value and benefits of interdisciplinary learning – Understanding the value and benefits of interdisciplinary learning and developing enthusiasm in both staff and students, leading to more effective embedding of interdisciplinarity. The values and benefits which could be communicated include (but are not limited to) interdisciplinary learning's ability to support and develop other elements of constructivist pedagogy, the evidence of benefits to student understanding, improved engagement, and better preparedness for the nature of further/higher education and the world of work.

As described above, there are a wide range of different purposes for interdisciplinary learning. Klein describes many of these at length – for example, the difference between narrow and broad interdisciplinarity and how these align with the aim of facilitating deep or more widely dispersed understanding.[55] Boix Mansilla and Dawes Duraising also identify many different purposes of interdisciplinary learning and argue that implementation and even assessment of interdisciplinarity should reflect the specific purposes chosen by educators.[56] Importantly, many authors have also written about how both the value and purpose of interdisciplinary learning needs to be fully understood and appreciated by both teachers and students in order for the interdisciplinarity to be at its most effective. For instance, Al Salami *et al* explain the significance of teachers embracing all of the benefits of interdisciplinary learning, and how this enthusiasm can make an integrated interdisciplinary area such as STEM more interesting and appealing to students.[57] Put differently, the enthusiasm for interdisciplinary learning can trickle down, and lead to significant benefits in terms of learning outcomes. Nelleke den Braber *et al* have also found the same in relation to the integration of mathematics with other aspects of STEM; it is vital that enthusiasm for interdisciplinarity is enabled and encouraged in teachers so that this might pass on to students.[58] Indeed, this point appears to be an area of near consensus in the academic literature. Other authors such as Patricia L. Hardré *et al*, Harris and Grenfell, and Margot and Kettler all find that in a variety of different contexts and disciplinary areas, teacher enthusiasm for and full understanding of both the value and purpose of interdisciplinary learning can pass on the same qualities to students and lead to the most effective interdisciplinary learning outcomes.[59]

---

[55] Klein, pp. 15-30.

[56] Boix Mansilla and Dawes Durraising, pp. 215-237.

[57] Al Salami *et al*, pp. 63-88.

[58] Ferri, R.B., 2019. Educación Matemática Interdisciplinaria en la escuela-ejemplos y experiencias. UCMaule, (57), pp. 25-37.

[59] Hardré, P.L., Ling, C., Shehab, R.L., Nanny, M.A., Nollert, M.U., Refai, H., Ramseyer, C., Herron, J. and Wollega, E.D., 2013. Teachers in an interdisciplinary learning community: Engaging, integrating, and strengthening K-12 education. Journal of Teacher Education, 64(5), pp. 409-425; Harris, V. and Grenfell, M., 2004. Language-learning strategies: A case for cross-curricular collaboration. Language Awareness, 13(2), pp. 116-130; Margot, K.C. and Kettler, T., 2019. Teachers' perception of STEM integration and education: a systematic literature review. International Journal of STEM Education, 6(1), p. 2.

3.4 Effective Pedagogy and Approaches to Interdisciplinary Learning

As Section 3.2 – The Relationship between Interdisciplinarity and other Pedagogic Ideas – made clear, interdisciplinarity should be delivered as part of a wider constructivist pedagogy, and these pedagogic links should be clearly articulated at the top level of teaching and learning guidance (see EoPP 4). However, this is not the limit of the promising pedagogic practices related to interdisciplinarity. This section will discuss the more practical side of pedagogy, such as the specific teaching and learning approaches which include classroom activities and ways of structuring the curriculum. Evidence from academic literature and organisational/national practice will be used to demonstrate the most promising practices to effectively integrate interdisciplinarity into K-12 programmes of education.

One of the most widely described teaching approaches for the effective deployment of interdisciplinary strategies is the use of project-based learning or learning that centres on problem solving. Starting with problem-solving, Russel Tytler *et al* for example, have suggested that the most effective use of mathematics in interdisciplinary contexts comes when "tasks are open and emphasise problem solving". [60] St. Clair and Hough have discussed the significance of problem solving within interdisciplinary education in detail, arguing that:

> "By focusing the curriculum on a problem or topic rather than on a discrete discipline, there is an increased opportunity to formalize the process of problem solving. By approaching a problem or topic from the vantage point of many teachers and/or disciplines, students are exposed to more information and more views, providing them with the raw material needed to construct understanding". [61]

Problem solving, as a curriculum approach, is closely linked to the pedagogy of student-led inquiry, and (as noted in Section 3.2, above) these ideas should be interlaced with interdisciplinarity to maximise effectiveness. Project-based learning is also frequently found alongside these aforementioned ideas. As Warr and West have pointed out "Problem-based learning, project-based learning, inter-disciplinary collaboration […] can all be examples of what Shaffer and Resnick (1999) called 'thickly authentic' learning experiences". [62] All of these notions are joined together in that they encourage students to look beyond knowledge accrual that can take place in single disciplines, and instead to construct understanding over the longer term with real-world challenges as context. Much of the academic literature discussing methods for delivering interdisciplinary learning asserts that project-based and problem-centred approaches are particularly effective.

A number of project-based qualifications offered within the K-12 context have a particular focus on developing problem-solving skills through student-led inquiry. For example, Pearson's Extended Project Qualification highlights the intention for students to develop and improve their own learning and performance as critical, reflective, and independent learners

---

[60] Ferri, p. 75.
[61] St Clair and Hough, p. 19.
[62] Warr and West, p. 14.

and to "develop and apply decision making and, where appropriate, problem solving skills".[63] Problem solving is developed collaboratively within the Cambridge Global Perspectives and Research programme. Reference is made within the assessment objectives to working "effectively in a group to identify an appropriate local problem with global relevance" and "considering a range of possible solutions".[64] This is linked to the team assessment task which involves working collaboratively to solve a local problem of global significance.

> **Element of Promising Practice 6**: To promote the use of authentic problem-solving and interdisciplinary project-based learning as two key tools for developing interdisciplinarity in the classroom – Problem-solving and project-based learning are both closely linked to effective constructivist pedagogy, enabling student-led inquiry and authentic learning. Both are also key practical conduits for interdisciplinary learning, in which students can develop organic links between disciplines by addressing real-world problems and using their conceptual understanding to carry-out projects which cross the boundaries of the subjects they are studying.

Research studies have also indicated the importance of having flexibility in a curriculum that seeks to incorporate interdisciplinary learning. The Rose Report of 2009 – which reviewed primary school education in England and looked for ways to better implement best practice – found that one of the barriers to effective cross-curricular education was the presence of too much prescribed content on the curriculum.[65] As Harris and Grenfell have described in relation to language learning, for the most effective work between disciplines, across the curriculum, "teachers need the freedom to take risks, to investigate their own classroom practice" and to be active, not passive developers of promising approaches.[66] It is therefore vital that sufficient flexibility is built into the curriculum, and this should be seen as a key pedagogic approach, that puts faith in teachers to critically reflect on their own practice. As well as providing opportunity for teachers to reflectively develop their practice in relation to interdisciplinarity, flexibility may also enable teachers to link project-based teaching to students' interests (as discussed by St. Clair and Hough) or to make the best use of new and interesting information coming from interdisciplinary research and innovation (as discussed by Nagle).[67] This might involve, for example, developing problem-based learning around a challenge which resonates with students, or which has been the subject of recent interdisciplinary research at academic or industry level – all of which requires a high degree of curriculum flexibility.

---

[63] Pearson Qualifications. 2019. Pearson Edexcel Level 3 Extended Project. p.3. Available at: https://qualifications.pearson.com/en/qualifications/edexcel-project-qualification/level-3.html. [Accessed 2/12/2020]

[64] Cambridge Assessment International Education. 2020. SYLLABUS: Cambridge International AS & A Level Global Perspectives & Research 9239. p.10. Available at: https://www.cambridgeinternational.org/Images/414971-2020-2021-syllabus.pdf. [Accessed 2/12/2020]

[65] Rose, J., 2009. Independent review of the primary curriculum: final report (London, DCSF).

[66] Harris and Grenfell, p. 127.

[67] St Clair and Hough; Nagle, pp. 144-147.

The importance of flexibility in delivery of an interdisciplinarity-based qualification can also be observed in the approaches to learning and teaching adopted in the Cambridge Global Perspectives and Research and in the College Board's AP Seminar and Research programmes. The Cambridge Global Perspectives programme is purposely designed to allow teachers and students to select global themes and topics, around which the "critical path" approach leads teachers to encourage students to deconstruct and construct arguments, reflect, and collaborate in order to deepen their understanding of the selected themes. Similarly, while the AP Seminar requires coverage of global themes, suggestions are made for teachers to elaborate and adapt according to the needs and interests of their students. Flexibility can also be observed in the Pearson Extended Project delivery guidance, with teachers being encouraged to act as mentors to students while delivery methods include whole-class teaching, small group teaching, and e-learning.[68]

> **Element of Promising Practice 7**: To create sufficient flexibility in the curriculum for teachers to authentically link learning to student interests, and new research developments, and to reflectively develop best practice approaches – A curriculum with very high levels of prescribed content and teaching methods will not contain sufficient flexibility for teachers to tailor learning to student interests and new areas of exploration in research/industry – both of which are key areas for effective interdisciplinary learning to be developed. Moreover, if teachers are enabled to be flexible, they can develop innovative and promising practice approaches to interdisciplinarity through collaboration and personal development.

Another promising approach, discussed by multiple authors in different contexts, is the use of multimodal sources in order to encourage effective interdisciplinary engagement. Byrne Bull and Dupuis express the benefits of this particularly clearly, explaining that their study into interdisciplinary overlaps in the teaching of biology and English found that "multimodal texts that include web-based resources, film, and digital texts offer students multiple pathways to reading, analyzing, and constructing their understandings in both content areas".[69] The authors argue that this leads to authentic interdisciplinary work as students unpick their own routes across the content area. Similar findings have also been reported in relation to the integration of mathematics with other parts of the curriculum. Sylvia Celedón-Pattichis *et al* have argued that multimodal resources can be used alongside image and video processing in order to handle mathematics in an interdisciplinary way, and therefore make a subject previously unfashionable to some students (in this context, middle school students from underrepresented socio-cultural backgrounds in STEM) more appealing.[70] Similarly, the Spanish photography and mathematics competition discussed by Segovia *et al* (described

---

[68] Pearson Qualifications. Edexcel Extended Project. Available at: https://qualifications.pearson.com/content/dam/pdf/Project-Qualification/Level-3/2010/Teaching-and-learning-materials/Extended-Project-Casestudy.pdf. [Accessed 2/12/2020].
[69] Bull and Dupuis, p. 77.
[70] Celedón-Pattichis, S., LópezLeiva, C.A., Pattichis, M.S. and Llamocca, D., 2013. An interdisciplinary collaboration between computer engineering and mathematics/bilingual education to develop a curriculum for underrepresented middle school students. Cultural Studies of Science Education, 8(4), pp. 873-887.

above), shows that developing innovative relationships between subjects can be facilitated by thinking laterally with the type of resources used to provoke inquiry and projects.[71]

The use of multimodal sources is encouraged by the approaches to teaching and learning in the Cambridge Global Perspectives and AP Seminar programmes. Primary and secondary sources are expected to be covered, which can be taken from web-based materials, books, journals, and digital texts. Texts on global themes may touch on knowledge from various disciplines, as highlighted in the AP Seminar programme. For example, it is intended that students acquire a rich understanding of the issues by "reading articles and research studies, reading foundational, literary, and philosophical texts; viewing and listening to speeches, broadcasts, and/or personal accounts and experiencing artistic works and performances".[72] Exposure to a wide variety of media and texts is of particular value in building students' critical appreciation of cultural and social, artistic and philosophical, political and historical, environmental, economic, scientific, futuristic, and ethical issues surrounding a global theme.[73] Quantitative and qualitative approaches to data analysis are covered within the Cambridge Research component and the AP Research programme, which both encourage a mixed method approach to investigating research questions.

> **Element of Promising Practice 8**: To encourage the use of a wide variety of multimodal sources, enabling students to build their own links between disciplines and explore knowledge areas – Multimodality posits "the notion that learning is not only a linguistic accomplishment, but is also linked to the dynamic interrelationship among the different semiotic modes of meaning, such as the linguistic, the visual, the gestural, the spatial or the audio mode, which individuals can draw on to derive and produce meaning" (Papadopolou and Avgerinou). Providing multimodal sources to students can enable them to develop their own interdisciplinary links in the process of developing understanding through the variety of different semiotic modes.

Also notable among the promising approaches to developing effective interdisciplinary learning is the use of teacher scaffolding in order to enable students to understand how, when, and why they are using individual disciplines and interdisciplinarity. This can help them to develop the ability to self-consciously reflect on what it means to juggle disciplines with interdisciplinarity. This sophisticated element of metacognition may require a level of intentional scaffolding on the part of teachers. Lyn D. English, for example, discusses the need to help students develop this kind of "representational fluency" – in which they can translate between the knowledge representations made within and across different disciplines.[74] Boix

---

[71] Segovia *et al*, p. 138-169.
[72] AP Board. 2020. AP Seminar. Course and Exam Description. p.11.Available at: https://apcentral.collegeboard.org/pdf/ap-seminar-course-and-exam-description.pdf?course=about-ap-capstone-diploma-program. [Accessed 2/12/2020].
[73] AP Board. 2020. AP Seminar. Course and Exam Description. p.12.Available at: https://apcentral.collegeboard.org/pdf/ap-seminar-course-and-exam-description.pdf?course=about-ap-capstone-diploma-program. [Accessed 2/12/2020].
[74] English, p. 7.

Mansilla and Dawes Duraising use the phrase "critical awareness", but the intended meaning is very similar. [75] For those authors, this form of awareness is one of the key pillars upon which effective interdisciplinary learning should lean. A promising approach to the development of interdisciplinary learning is, therefore, the scaffolding needed in order to support students to develop metacognitive awareness of their own use of disciplines. This information supplements the promising practice highlighted by EoPP 5.

In terms of metacognitive approaches suggested by specific qualifications, developing a critical awareness of learning is a key aim and integrated component of the learning process in the Cambridge Global Perspectives programme, echoing Boix Mansilla and Dawes Duraising's key pillar for effective interdisciplinary learning. Students are expected to reflect on their own thought process in deconstructing and constructing arguments on a range of global themes. The scaffolding teachers use to develop this approach – which includes asking key questions relating to others' perspectives and viewpoints as well as their own – encourages students to formulate opinions by considering competing arguments and lines of reasoning.

3.5 Overcoming Common Challenges to Interdisciplinary Learning

The literature on the implementation of interdisciplinary learning at K-12 level describes a wide array of challenges which may occur. Not all of these have straightforward fixes that can be simply isolated as promising practice; however, there are some actions highlighted by multiple authors which have the potential to lessen the impact of, if not overcome, these challenges. Some challenges have such extensively discussed mitigation methods that they will be addressed with their own section of the literature review; for instance, Section 3.9 – on striking the right balance between disciplinary learning and interdisciplinary learning – and Section 3.10 – on how to support and enable teacher collaboration when time is such a precious commodity. The challenges analysed in this section either have more limited discussion in the academic literature or have more straightforward mitigation practices compared to those larger themes.

A clear challenge faced by the integration of multiple disciplines in any context – whether that is research, higher education, or indeed K-12 – is the fact that different disciplines use different methods, logics, and concepts which may seem impenetrable to someone coming from a different disciplinary perspective (including both teachers and students). Elayne J. Shapiro and Carol J. Dempsey, in their research into interdisciplinary teaching, identify this challenge and suggest that "pro-active attention may minimize negative consequences" regarding differences in processes. This pro-active attention can take many forms, not least being aware that the challenge is inevitable, but the authors also suggest that "creative problem-solving that is attuned to the content and identity issues and mindful of the process and relationship issues can help achieve integration and collaboration when two disciplines join forces". [76] Shapiro and Dempsey were explicitly discussing interdisciplinary team-teaching, however

---

[75] Boix Mansilla and Dawes Duraising. pp. 215-237.
[76] Shapiro, E.J. and Dempsey, C.J., 2008. Conflict resolution in team teaching: A case study in interdisciplinary teaching. College teaching, 56(3), pp. 157-162.

their arguments about showing pro-active engagement with the inevitability of disciplinary methods and processes clashing are relevant to students' interdisciplinary learning too. Similarly, Seongsook Choi and Keith Richards have identified the challenge of interdisciplinary discourse leading to clashing approaches, even down to the level of terminology and the concepts used in problem-solving. Their suggestion for lessening the impact of these obstacles is also to recognise their inevitability and to focus time on building conceptual bridges, rather than getting bogged down in the specific differences in areas such as terminology.[77] Maria Cristina Oliveria da Costa and Antonio Manuel Dias Domingos, in their discussion of STEAMH (or the addition of heritage studies, to the more common STEAM of science, technology, engineering, arts, and mathematics) suggest that continuing professional development for teachers is vital for overcoming the challenges of integrating traditionally unfamiliar disciplines.[78] This issue of teacher CPD will be discussed more extensively in Section 3.10. However, while discussing the particular challenges of asking teachers to work outside of their area of disciplinary specialism, it is interesting to note that Hasni *et al* recommend time being put aside for teachers to be shown the logics and key processes behind subjects outside of their specialism.[79] This challenge of clashing processes/concepts/logics is inevitably a substantial one, but there are methods (including well-structured CPD, and pro-active anticipation of the challenge) which can mitigate its impact.

The challenge of ensuring sufficient subject-specific expertise and the understanding of discipline-specific terminology has been highlighted by qualifications focused on interdisciplinary learning contexts. The Pearson Extended project qualification, for example, specifies the role of the teacher as a mentor and provides guidance for non-specialist teachers to assess interdisciplinary application of skills and knowledge from areas outside of their expertise. The combined approach of using a teacher/assessor who focuses on general skills development of planning, managing, and reviewing a project, as well as a subject-expert(s) for providing advice on the student's chosen topic, is recommended for delivery of the programme.[80] Given the flexibility with which the qualification can be offered and the broad range of projects that can be undertaken, the importance of engaging teachers with a range of backgrounds who have experience in different subjects and methods is thought to be essential to the effective delivery of a qualification focused on interdisciplinary learning and application.

Another challenge that is well-observed and frequently discussed in academic literature is the potential for only shallow or insubstantial interdisciplinarity to be developed, rather than a thoroughgoing interdisciplinarity which uses interdisciplinary methods to create deep as well as broad understanding. The different types of interdisciplinarity are discussed extensively by Klein, and described in Section 3.1 of this literature review.[81] Gilles Baillat and Daniel Niclot,

---

[77] Choi and Richards.

[78] da Cristina Oliveira, M.C.O., 2017. Promoting STEAMH at primary school: a collaborative interdisciplinary project. New Trends and Issues Proceedings on Humanities and Social Sciences, 4(8), pp. 234-245.

[79] Hasni *et al*, pp. 175-176.

[80] Pearson Qualifications. 2019. Pearson Edexcel Level 3 Extended Project. Available at: https://qualifications.pearson.com/en/qualifications/edexcel-project-qualification/level-3.html. [Accessed 2/12/2020].

[81] Klein, pp. 15-30.

with reference back to the work of Yves Lenoir, describe this challenge as the difference between developing genuine interdisciplinarity and pseudo-interdisciplinarity.[82] The latter, rather than building substantial links between disciplines which further the purpose of the study, merely develops shallow and anecdotal examples of one discipline supporting another. This may tick the box of interdisciplinarity, but in name only rather than substance. Indeed, Hasni, Lenoir, and Froelich's study of interdisciplinary learning in schools in Quebec found that shallow interdisciplinarity was frequently being deployed, rather than a more substantial form. The authors developed a full list of recommendations in order to improve that situation, including the aforementioned CPD (to be discussed further in Section 3.10) and the building of a school-wide awareness of the importance of interdisciplinarity that does not prioritise some subjects as being more important than others (with the danger that those unprioritized disciplines become merely support-subjects for those treated as priorities). The work of Julie Stern, Krista Ferraro, and Juliet Mohnkern also allows us to add to these recommendations for avoiding shallow or merely anecdotal interdisciplinarity by appropriately integrating intelligent use of both macro and micro concepts in the curriculum. Macro concepts can stretch across disciplines and enable the bridge-building that represents substantial interdisciplinarity, while micro concepts help with the deeper delving within disciplines. By ensuring that a combination of these types of conceptual understanding is developed, interdisciplinarity can be developed which stretches broadly across disciplines but also makes use of deep learning throughout the process.[83] Such mitigation strategies may increase the likelihood of the most effective forms of interdisciplinary learning being developed in practice.

The Scottish Baccalaureate programmes serve as an example of an externally assessed award and curriculum which includes an interdisciplinary project, designed to explicitly draw upon knowledge and skills acquired across disciplines.[84] For instance, the science project calls on skills and knowledge areas from biology, chemistry, mathematics, and physics placing interdisciplinarity as the main focus of the project.

Acknowledging the challenge of shallow interdisciplinarity, the practical importance of differentiation and tailoring interdisciplinary aspects of curricula content to suit different learners has been identified as key to creating effective interdisciplinary learning opportunities, as highlighted in the Scottish Curriculum for Excellence Briefing, which sets out an interdisciplinary learning agenda for the K12 education in Scotland.[85] In particular, the Briefing advises teachers to consider how higher order thinking skills should be developed in relation to interdisciplinary topics and the degree to which students are sufficiently prepared to engage in interdisciplinary learning, particularly at elementary and lower-secondary levels. The importance of follow-up and consolidation are highlighted as key in addressing the issue of shallow interdisciplinarity, as well as consistent planning and progression of interdisciplinary learning between stages to ensure the appropriate incremental development of skills and knowledge.

---

[82] Baillat, G., Niclot, D., Lenoir, Y. and Klein, J.T., 2010. In search of interdisciplinarity in schools in France: From curriculum to practice. Issues in Interdisciplinary Studies. p. 197.
[83] Stern *et al*.
[84] SQA. 2009. National Unit Specification: general information: Science: Interdisciplinary Project (Advanced Higher). Available at:
https://www.sqa.org.uk/sqa/files_ccc/Science_Interdisciplinary_Project.pdf. [Accessed 2/12/2020].
[85] Education Scotland. 2012. CfE Briefing Interdisciplinary Learning. Available at:
https://education.gov.scot/Documents/cfe-briefing-4.pdf. [Accessed 2/12/2020].

All the above issues speak to a wider potential challenge of a disconnect between theory and practice in the deployment of interdisciplinary learning. Margot and Kettler, in their wide-ranging analysis of challenges to the implementation of interdisciplinary learning found that teachers might have concerns of hurdles presented by "pedagogical challenges, curriculum challenges, structural challenges, concerns about students, concerns about assessments, and lack of teacher support".[86]

<div style="border: 2px solid #1F4E79; padding: 10px;">

Element of Promising Practice 9: To show proactive engagement with the key challenges which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning – Proactively engaging with, and providing mitigation strategies for, some of the most common challenges facing interdisciplinary learning can help to bridge the divide between theory and practice. Challenges may include clashing logics/processes/concepts emerging in interdisciplinary discourse and pseudo-interdisciplinarity being embedded rather than genuine interdisciplinary learning. Suggested mitigation strategies may include CPD, explanation of how deep disciplinary learning can be integrated into interdisciplinarity (for example, through macro and micro concepts), and emphasising the conceptual bridges between disciplines rather than smaller issues such as terminological barriers.

</div>

3.6 Progression and Age-Appropriate Interdisciplinarity

One of the hurdles when researching and understanding promising practice for the K-12 education context is that there is such a wide variety of challenges and opportunities presented by the different stages within K-12. The use of interdisciplinary learning has many common features at primary, middle, lower-secondary, and upper-secondary level, but there are also significant differences between a 6-year-old and an 18-year-old regarding how interdisciplinarity might be used and understood. Some of the key hurdles facing the effective embeddedness of interdisciplinary learning relate to whether the same ideas and approaches can be applied to all age groups in the K-12 spectrum. As with many other thematic areas addressed in this literature review, the level of available evidence may not always meet the large-scale, control-group-tested threshold that is desirable in the sciences and social sciences. However, the evidence of multiple smaller studies along with existing practical deployment in various contexts can be stitched together to develop a viable picture of promising practice.

One element of promising practice, suggested by analysing and synthesising a variety of sources, is that age-appropriate methodologies and approaches can and should be embedded

---

[86] Margot and Kettler, p. 1. See also, Williams, J., Roth, W.M., Swanson, D., Doig, B., Groves, S., Omuvwie, M., Borromeo Ferri, R. and Mousoulides, N., 2016. Interdisciplinary mathematics education. Springer Nature. for a similar identification of potential hurdles.

into interdisciplinarity at different parts of the K-12 spectrum. The overall impression is that K-12 interdisciplinary learning can be tailored with age-appropriate components in order to develop it in the most effective way for various age groups. For instance, Barbara Nagle has described the significance of making sure that instructional strategies "must be age-appropriate in terms of the conceptual understanding".[87] Interdisciplinary concepts can vary significantly in their complexity, from straightforward notions with easily understandable disciplinary links (e.g. "shape" as a concept that bridges art and mathematics) to complex ideas with more intricate relationships to specific subjects (e.g. "corruption" as a concept to bridge politics, history, and biology). As such, it is important to strategically consider how interdisciplinary approaches build on age-appropriate expectations of prior knowledge and depth of understanding.

The importance of considering age appropriateness when planning interdisciplinary learning is articulated clearly at a national level in the Scottish Curriculum for Excellence programme, which applies to all stages of the K-12 continuum. There is an intention within the curriculum to tailor interdisciplinary learning activities according to the learner's age and individual learning style, reflecting the recommendations of Barbara Nagle on the level of conceptual understanding expected to be developed at different ages.[88] For example, educators in Scotland are encouraged to consider how planning for interdisciplinary learning also relates to curriculum design principles of "challenge and enjoyment; breadth; progression; depth; personalisation and choice; coherence; relevance".

Considering how interdisciplinarity may be developed across the K-12 age continuum in practice, the US Core State Standards are an initiative designed to introduce overarching literacy and numeracy standards across states which explicitly allow scope for interdisciplinary application. Reviewing the standards for literacy, which apply across disciplines, there is particular scope for interdisciplinary knowledge and skills development from elementary to secondary level through developing reading skills and coverage of an increasingly wider range of non-fiction and fiction tests. The complexity of texts increases throughout the age continuum in order to develop critical thinking abilities. At Grade 11-12 level students are, for example, expected to "integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem".[89] The learning outcomes represent a cumulative approach to reading skills development that can be applied across subjects and contexts, supported by instructional strategies that are appropriate to the age level and learner needs.

Another recurring theme in the literature addressing age-appropriate interdisciplinarity is the notion of primary school curricula being the most extensively integrated, with a gradual shift towards awareness of disciplinary boundaries as the age of students increases. This model was proposed, for example, by the Rose Report of 2009, which examined the current state of primary school education in England and made recommendations regarding how improvements could be made. One of the Rose Report's findings was that interdisciplinary

---

[87] Nagle, p. 146.
[88] Education Scotland. 2008. Curriculum for excellence building the curriculum 3 a framework for learning and teaching. Available at: https://education.gov.scot/Documents/btc3.pdf [Accessed 2/12/2020].
[89] Core Standards. Preparing America's students for success. Available at: http://www.corestandards.org [Accessed 2/12/2020].

and cross-curricula learning areas are appropriate for the primary school curriculum, and that these broad learning areas should enable development towards a more subject-based curriculum in the following years, as it becomes appropriate.[90] Part of the preconception behind such analysis is that an important part of higher education readiness is strong subject-based qualifications (indeed for some subjects, such as mathematics and English language, the same assumption may apply to career or job-market readiness). As a result, the perception that defined-subject qualifications are needed post-K-12 leads to the conclusion that secondary-level education should be increasingly subject-based. However, as we have seen in Section 3.2 of this literature review, interdisciplinary learning is valuable and therefore age-appropriate across the entire K-12 spectrum. Therefore, the promising practice in this regard involves developing subject and discipline awareness, while continuing to deploy interdisciplinary approaches in teaching and learning. Lyn D. English has described the need for students to be able to not only develop disciplinary knowledge and interdisciplinary understandings, but to have confidence in their awareness of how they are using disciplines and when they are blurring the lines between them.[91] Therefore, although it is appropriate to introduce more disciplinarity after the primary school level, it is possible to do this without moving away from interdisciplinarity, but by building an understanding of the functioning of disciplines into the curriculum in those post-primary years.

> **Element of Promising Practice 10**: To develop interdisciplinarity within an age-appropriate structure, with scope for development along the K-12 age continuum – Promising practice indicates that interdisciplinary learning is an age-appropriate pedagogy throughout the K-12 age spectrum. However, this does not mean that interdisciplinarity is a static phenomenon in K-12; it should evolve with students' abilities and academic needs. Special attention should be given to the use of concepts which are age-appropriate in complexity, and (following primary-level education) students should increasingly be made aware of how they are using disciplinary knowledge in order to develop interdisciplinary understanding. This does not mean than interdisciplinary themes should be phased out for older students.

Whilst there has been a move towards secondary level qualifications becoming more discipline-specific at upper secondary level in the UK, as observed in the Rose Report, the value of interdisciplinary learning at secondary level has been recognised and integrated within a number of international baccalaureate qualifications. For example, in the form of interdisciplinary projects as is the case with the Scottish Baccalaureate or the Integrated Project taken as part of the Quebec Secondary School Diploma programme. Furthermore, the introduction of Cambridge Global Perspectives and Research, as well as skills-based awards such as AP Seminar and Research in the US, provide opportunities for structured interdisciplinary study leading towards qualifications which are intended to facilitate progression and application of cross-disciplinary skills at higher education level. Rather than

---

[90] Rose Report, pp. 10-11.
[91] English, p. 3.

building an understanding of functioning of disciplines into subject-specific curricula, these awards aim to develop an interdisciplinary approach around global themes or projects.

Moreover, components such as the Interdisciplinary Project of the Scottish Baccalaureate represent a more focused attempt to deepen the understanding of a discipline, for instance, science. This can lead to more explicit links being made between the different topic areas within biology, physics, and chemistry – building upon the detailed knowledge and conceptual understanding acquired in each field. Such an approach reflects the importance Lyn. D English places on developing discipline awareness in order to promote interdisciplinary understanding.

3.7 Interdisciplinary Skills

Putting skills and/or competences into the frame with interdisciplinary learning raises a number of fundamental questions: what skills/competences are *required* for effective interdisciplinary learning? What skills/competences are *generated* by effective interdisciplinary learning? Is interdisciplinarity itself a skill/competence? These questions, and a full understanding of how interdisciplinarity interacts with skills and competences, are far from fully settled in the academic literature. Indeed, Jenneth Parker has suggested that research to-date has left "interdisciplinary competencies as largely unarticulated, but desirable elements – in fact, a 'black box' in need of unpacking".[92] This section of the literature review will aim to unpack some elements of that 'black box', but there will inevitably still be open questions that remain. Regarding the definition of skills and competences, we defer to the definitions offered by CEDEFOP's glossary of education-related key terms:

> "**Competence**
>
> Ability to apply learning outcomes adequately in a defined context (education, work, personal or professional development).
> or
> Ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development.
>
> Comment: competence is not limited to cognitive elements (involving the use of theory, concepts or tacit knowledge); it also encompasses functional aspects (including technical skills) as well as interpersonal attributes (e.g. social or organisational skills) and ethical values.
>
> **Skill**
>
> Ability to apply knowledge and use know-how to complete tasks and solve problems."[93]

---

[92] Parker, pp. 7-8.
[93] CEDEFOP. 2014. Glossary of key terms. Available at: https://www.cedefop.europa.eu/en/events-and-projects/projects/validation-non-formal-and-informal-learning/european-inventory/european-inventory-glossary. [Accessed 2/12/2020].

There is considerable academic literature available which purely discusses the meaning of these terms, but from this limited approach taken here, it is evident that there is significant overlap between competences and skills. However, perhaps skills have a slightly broader definition, whereas competences are often discussed in terms of being applied in a defined context. In some situations, authors may slip between these terms in their usage, and this literature review may do the same where accurate to reflect the linguistic choices of individual authors.

It could also be argued that skills or competences are interdisciplinary by nature. In order to understand this better, it is helpful to look at some specific examples of skills/competences. The European Commission has published details of a framework named "Key Competences for Lifelong Learning", which partly emerged out of the perceived "need to go beyond the boundaries of subjects, [and] enable cross-discipline learning".[94] The key competences in question are shown in the following image:[95]

Figure 9: EU Key Competences for Lifelong Learning

It is clear from the title of these competences that they are highly likely to bridge disciplinary areas, and the image itself underscores that with its scattered visual references to different

---

[94] European Union. 2019. *Key Competences for Lifelong Learning*, p. 3. Accessed at https://op.europa.eu/en/publication-detail/-/publication/297a33c8-a1f3-11e9-9d01-01aa75ed71a1/language-en. [Accessed 03/12/2020].
[95] *Key Competences*, p. 1.

subjects (e.g. "X + Y =" for mathematics or science; the video play symbol for digital arts; the sand-timer perhaps representing history, etc.). This is only one example, but it is representative of the fact that a skills- or competence-based approach to education is highly likely to cross-over into interdisciplinary learning.

There are some authors who in their discussion of interdisciplinary learning imply that interdisciplinarity may, in its own right, verge on the definition of a skill. For example, Bestelmeyer *et al* suggest, in their phrasing, that interdisciplinary thinking might be classified as a skill alongside other well-known skills such as collaboration and communication. They argue that the type of global ecology projects that students should be prepared for through interdisciplinary learning "require collaboration, interdisciplinary thinking, and strong communication skills".[96] Similarly, Nagle implies that cross-disciplinary thinking might be a skill in its own right when arguing that "to truly bring out the interdisciplinary nature of these [interdisciplinary STEM] topics will take time for students to reflect on the cross-disciplinary thinking and collaboration involved".[97] Also, Warr and West place a heavy emphasis on the significance of "interdisciplinary collaboration skills", which – with its emphasis on "managing time and expectations as well as building a common vocabulary" – seems to represent a different skill compared to "collaboration skills" without the modifier.[98] Overall, these works do not fully define and differentiate interdisciplinarity as a skill in its own right, but there is an implication across such texts that interdisciplinary thinking may qualify as a skill in some contexts.

Elsewhere in the academic literature, the emphasis is on the skills needed by students to carry out effective interdisciplinary work. Boix Mansilla and Dawes Duraising synthesised the sort of skills that other researchers have discussed in relation to the effective deployment of interdisciplinary learning – highlighting those such as "integration of knowledge, freedom of inquiry, and innovation", "deductive reasoning, reasoning by analogy and, in particular, synthetic thinking", and a wide variety of cognitive skills "ranging from critical thinking to sensitivity to bias and ethical issues".[99] There are, therefore, a wide variety of skills that may be considered highly valuable for students to successfully carry out genuinely interdisciplinary work, with many of these revolving around processes of critical thinking, synthesis, and metacognitive awareness of perspectives. Lyn. D. English focuses her analysis upon that metacognitive element, suggesting that students need to have the "representational fluency" that enables them to recognise both disciplinary and interdisciplinary representations of knowledge, and to move intelligently between these.[100] Other authors, such as Charlotte Woods, place their emphasis on communicative skills, and the way that these facilitate interdisciplinary through teamwork and the understanding of multiple perspectives.

Whilst encouraging interdisciplinarity is linked to the overarching aims of the Cambridge Global Perspectives and Research programme, assessment objectives specify the skills which are involved in interdisciplinary study of global themes and perspectives, mirroring Boix Mansilla and Dawes Duraising's conception of interdisciplinary skills as being those required to carry

---

[96] Bestelmeyer *et al*, p. 37.
[97] Nagle, p.146.
[98] Warr and West, p.14.
[99] Boix Mansilla and Dawes Duraising, p. 217.
[100] English, p. 7; see also Klausen, S. H., 2014. Transfer and Cohesion in Interdisciplinary Education. Nordidactica: Journal of Humanities and Social Science Education, (1), pp. 1-20.

out effective interdisciplinary work. Assessment objectives (AOs) include the skills of research, analysis, and evaluation (AO1), reflection (AO2), and communication and collaboration (AO3).[101] A proactive and independent approach to interdisciplinary learning is recommended by Cambridge, involving skills such as: being able to conduct a detailed analysis of multiple points of view relating to a global theme; reflecting on one's own viewpoint; and communicating and collaborating to present conclusions effectively. This practice ties in with Woods' findings described above.

Finally, there are many researchers who have described specific skills or competences which can and should be effectively developed in students as a result of experiencing effective interdisciplinary learning. These are such numerous skills and competences in the existing literature, that there is only space here to provide a handful of selected examples. Some of these are familiar from previous paragraphs, as there is often an overlap between what is *useful for* interdisciplinary learning and what is an *outcome of* interdisciplinary learning. Klein, for instance, has suggested that effective interdisciplinary teaching often emphasises the development of critical thinking skills.[102] St Clair and Hough have also emphasised the development of decision-making skills, while Gero and Zach discuss the development of systems-thinking skills.[103] The Rose Report also highlights the need for an interdisciplinary curriculum to be shaped around the development of key skills, including, for example, ICT proficiency.[104] Warr and West, similarly, point to certain skills that are in high demand from students – they suggest that "Learning and Innovation Skills" classify as one of these high-value skills that can be effectively developed by interdisciplinary learning.[105]

Critical thinking, decision making, and ICT literacy are developed in multiple qualifications reviewed which have an interdisciplinary focus. These could be considered skills acquired as outcomes of effective interdisciplinary study throughout the programmes. Critical thinking is developed through exploring alternative viewpoints and arguments, which may reflect varying backgrounds and disciplines in both the Cambridge Global Perspectives and Research programme and the College Board AP Seminar and Research programme. For instance, as a sub-skill, Cambridge Global Perspectives students are expected to "critically evaluate the strengths, weaknesses and implications of reasoning in arguments and overall perspectives".[106] Decision making is more explicitly developed as a skill in project-based qualifications such as the Extended Project Qualification offered by Pearson, which specifies the aim to "develop and apply decision making and, where appropriate, problem solving

[101] Cambridge Assessment International Education. 2020. SYLLABUS: Cambridge International AS & A Level Global Perspectives & Research 9239. p.13. Available at: https://www.cambridgeinternational.org/Images/414971-2020-2021-syllabus.pdf. [Accessed 2/12/2020]

[102] Klein, p. 7.

[103] St Clair and Hough; Gero, A. and Zach, E., 2014. High school programme in electro-optics: A case study on interdisciplinary learning and systems thinking. International Journal of Engineering Education, 30(5), pp. 1190-1199.

[104] Rose Report, p. 11.

[105] Warr and West, p. 1.

[106] Cambridge Assessment International Education. 2020. SYLLABUS: Cambridge International AS & A Level Global Perspectives & Research 9239. p. 13. Available at: https://www.cambridgeinternational.org/Images/414971-2020-2021-syllabus.pdf. [Accessed 2/12/2020].

skills".[107] This implies that decision making may draw upon subject knowledge from across different disciplines. ICT proficiency features as one of the core cross-curricular competencies in the Quebec Secondary School Diploma programme which is assessed in the Integrative Project.[108]

> **Element of Promising Practice 11**: To explain the link between interdisciplinarity and key skills and competences including communication, critical thinking, synthesis, and metacognitive awareness of perspectives – It is possible to view interdisciplinary thinking as a skill/competence in its own right, or as something requiring certain skills, or as a phenomenon giving rise to other desirable skills. It is not essential to define interdisciplinary learning's exact place within the process of skill/competence development, but it should be explained that specific core skills/competences are linked to interdisciplinary learning and should be developed/used alongside interdisciplinarity.

Overall, it may not be necessary to fully differentiate between what is a useful skill for interdisciplinary learning, what skills or competences are outcomes of effective interdisciplinary learning, and when interdisciplinarity itself is a skill. As has been evident from the research summarised above, there is significant overlap between these areas. However, it is clear that promising practice should engage with the skills/competences which are frequently placed in the same analytical frame as interdisciplinary learning. These include communication, synthesis, critical thinking, and the ability to understand how knowledge is formed both within and between disciplines.

3.8 Assessing Interdisciplinary Learning

The issue of assessment in relation to interdisciplinary learning is one of the most significant areas that is clearly in need of further practical research. Kelly Margot and Todd Kettler discussed this issue in relation to STEM assessment, but the same findings could apply to the integration of any other disciplines. They suggest that "research into effective formative assessment strategies during STEM education needs to be conducted".[109] Moreover, Margot and Kettler focused on formative assessment and the positive impacts this can have on teachers' understanding of their students' needs. However, this does not exclude the findings from also applying to summative assessment. As briefly described above, there is a perception that upper-secondary students need subject-based qualifications (with the corresponding disciplinary assessments) in order to be well placed for higher education, further education, or the job market. There is, therefore, an inherent challenge in knowing how to blend the need for subject-based qualifications with the benefits of interdisciplinary learning and knowing how

---

[107]Pearson Qualifications. 2019. Pearson Edexcel Level 3 Extended Project. p.2. Available at: https://qualifications.pearson.com/en/qualifications/edexcel-project-qualification/level-3.html. [Accessed 2/12/2020].

[108]Quebec Education Programme: Secondary Cycle 2. p. 46. Available at: http://www.education.gouv.qc.ca/fileadmin/site_web/documents/education/jeunes/pfeq/PFEQ_competences-transversales-deuxieme-cycle-secondaire_EN.pdf. [Accessed 2/12/2020].

[109] Margot and Kettler, p. 15.

to develop a method in which assessment recognises both of these facts. This difficulty is compounded by the inherent challenge of assessing interdisciplinarity when it is shifting phenomenon with sometimes undefined or only implicit links to learning outcomes. Although these issues have not yet been resolved, there are elements of promising practice within the literature and existing practice which can help to develop effective strategies for interdisciplinary assessment.

At the outset, it is important to establish that assessment is a vital component of interdisciplinary learning, and that the full effectiveness of interdisciplinary learning cannot be seized without embedding interdisciplinarity into assessment practices. Barbara Nagle, for example, has argued that effective interdisciplinary education should "promote the development of classroom and standardized assessments that go beyond memorization of facts to assess connections between concepts and the ability to apply these concepts to […] questions and problems". [110] Similarly, Melissa Warr and Richard E. West have suggested that in promising-practice interdisciplinary learning "instructors should carefully consider how assessment methods both reflect the learning process and are effective at evaluating deep student learning". [111] These comments contain some implicit ideas about what interdisciplinary assessment may resemble, but further elements can be synthesised from a collection of other research studies.

> **Element of Promising Practice 12**: To take interdisciplinary learning into account in the design of assessment – Assessment should form a key part of how interdisciplinarity is integrated into the curriculum. Moreover, the nature of that assessment should reflect the key aims and processes underpinning the exact nature of interdisciplinarity described to students within curricula resources.

Nagle's comment, above, highlights the value of using concept-based understanding as a tool to assess interdisciplinarity. As discussed at length in Section 3.2 of this literature review – The Relationship between Interdisciplinarity and other Pedagogic Ideas – promising practice indications are that concept-based teaching and learning should be intricately connected to interdisciplinarity. Nandu C. Nair *et al* also substantiate this link between concepts and effective interdisciplinary assessment. They present a case study model in which concepts are individually tested, and feedback can be given in order to allow for tailored development. [112] While interdisciplinarity can take many forms and cross all domains of knowledge, assessment through concepts is one valuable avenue for testing the effectiveness and sophistication of interdisciplinary understanding – particularly if candidates are being asked to apply concepts to authentic problems, as suggested by Nagle.

One research article which has looked at the issue of interdisciplinary assessment in more detail has been produced by Veronica Boix Mansilla and Elizabeth Dawes Duraising – seeking an empirically grounded framework for the targeted assessment of students' interdisciplinary work. Following an extensive review of the existing literature, the authors concluded that

---

[110] Nagle, p. 147.
[111] Warr and West, p. 14.
[112] Nair *et al*, pp. 848-854

assessment for interdisciplinary learning should be based on three principles: strong disciplinary foundations, the degree to which integration of disciplines is advancing students' understanding in relation to the purpose of the work, and students' clarity about understanding their aims, the nature of the interdisciplinary processes, as well as the limitations of their efforts. These three pillars are summarised as disciplinary grounding, advancement through integration, and critical awareness. Each of these ideas is described and defined at length by Boix Mansilla and Dawes Duraising, with clear justifications as to why these features of interdisciplinary assessment can lead to high-quality outcomes and accurate representations of candidates' interdisciplinary skills. [113] This targeted assessment framework certainly shows promise, due to its basis in such an extensive review of available evidence.

As highlighted in previous sections, there are a number of international and national interdisciplinary-focused qualifications that seek to offer skills-based assessment as well as assessing the depth, breadth, and relevant deployment of subject knowledge. The assessment of effective interdisciplinary study and application of knowledge from multiple disciplines in order to solve problems, although not explicit, is often implied through assessment objectives and criteria used to assess task-based performance. Tasks from the Cambridge Global Perspectives programme for instance naturally lend themselves to some interdisciplinary linking of subject knowledge. Although as a skills-based programme, limits are placed on the assessment of depth and advancement of interdisciplinary integration. In one such assessment task, the student is asked to explore who should be responsible for funding events such as the Olympics. [114] The ability to research and analyse different perspectives to emerge from this issue would involve integrating knowledge of economics, politics, culture, and ethics, while demonstrating awareness of the interrelationship between these different perspectives or schools of thought.

Assessment criteria for the Cambridge Global Perspectives programme also refer to a range of skills that may be considered outcomes as well as facilitators of the interdisciplinary learning process, such as critical thinking, reflection, and analysis. Review of descriptors reveals that success on assessment tasks depends to a certain extent on effective demonstration and linking of knowledge from more than one subject. Equally, students are assessed on their critical awareness and ability to reflect on global themes from multiple perspectives.

The Interdisciplinary project included as part of the SQA Scottish Baccalaureate serves as an example that, although like the Cambridge award is primarily skills-based, also provides a focused assessment of interdisciplinary knowledge. [115] There is scope for assessing the candidate's understanding of individual disciplines (their foundational knowledge in biology for instance) as well as their ability to integrate knowledge from across a wider discipline (biology with chemistry for instance) as a whole, in solving an authentic problem. Assessment criteria evaluate the student's "application of specialist and interdisciplinary subject knowledge to

---

[113] Boix Mansilla and Dawes Duraising, pp. 215-237.
[114] Cambridge Assessment International Education. 2020. SYLLABUS: Cambridge International AS & A Level Global Perspectives & Research 9239. Available at: https://www.cambridgeinternational.org/Images/414971-2020-2021-syllabus.pdf. [Accessed 2/12/2020].
[115] SQA. 2009. National Unit Specification: general information: Science: Interdisciplinary Project (Advanced Higher). Available at: https://www.sqa.org.uk/sqa/files_ccc/Science_Interdisciplinary_Project.pdf. [Accessed 2/12/2020].

establish meaningful connections within the broad theme". The highest levels of performance on the project are indicative of "accurate and deepening of understanding through application of subject knowledge in the chosen context, with meaningful connections well established". This indicates a focused assessment of interdisciplinary understanding.

> **Element of Promising Practice 13**: To link interdisciplinary assessment with conceptual understanding, disciplinary grounding, advancement through integration and critical awareness – The best exact format through which to carry out assessment of interdisciplinary learning may not have been settled by research, but there are several promising components which are likely to effectively assess the most desirable features of interdisciplinary learning. These are conceptual understanding (potentially linked to authentic contexts), a strong grounding in disciplinary knowledge, demonstration that interdisciplinarity is advancing the aim of the learning in a way that isolated disciplines would not, and critical awareness of how interdisciplinarity is being used and for what purposes.

3.9 Interdisciplines, Disciplines, and Disciplinary Knowledge

As briefly discussed above – including in the previous section addressing interdisciplinary assessment – interdisciplinarity is not the opposite or antonym of disciplinarity; rather, disciplines and interdisciplinarity should be in a mutually beneficial relationship. Put differently, disciplines and interdisciplinarity should both be part of a balanced and intelligently structured curriculum at K-12. Moreover, there is not a binary between traditional disciplines (as one structure for a curriculum) and general interdisciplinarity (as an alternative structure). Instead, disciplines can incorporate interdisciplinary work, interdisciplinary curriculum components can draw heavily upon individual disciplines, and discipline-like courses or subjects can be developed which are interdisciplinary by nature (these are sometimes referred to as interdisciplines). This section of the literature review will examine promising practices related to the relationship between interdisciplinarity and the general ideas of disciplines and interdisciplines, as well as specific individual disciplinary areas.

As described above, there is something approaching consensus in the academic literature concerning the fact that interdisciplinarity should build on a strong foundation provided by the disciplines. This was raised clearly by the targeted assessment framework described by Boix Mansilla and Dawes Duraising and was also one of the key findings of the Rose Report describing best practice in primary-level education.[116] In the context of interdisciplinary research, Vanesa Castán Broto *et al* have also stated that disciplines are a vital point of reference for effective interdisciplinarity.[117] There is also evidence in the academic literature regarding some of the effective means through which interdisciplinarity engages the disciplines while also moving across and between them. Lyn D. English, for instance, has described the importance of developing scaffolding so that students become aware of how

---

[116] Boix Mansilla and Dawes Duraising, pp. 215-237; Rose Report.
[117] Broto *et al*, pp. 922-933.

they are using disciplinary knowledge to develop interdisciplinary understanding. [118] Kelly Byrne Bull and Juliann B. Dupuis have used the metaphor of "hooks" to describe how knowledge and understanding gained in one discipline can be activated by prompts in another discipline and therefore lead to the organic development of interdisciplinary thinking. While Stern *et al* have extensively discussed the simultaneous use of both macro concepts (which have relevance across multiple disciplines) and micro concepts (which help to promote deep knowledge within a discipline) to develop interdisciplinary learning in the most effective way. [119] The precise methods for enabling interaction between interdisciplinarity and the disciplines are still open to further innovation and development, but the core point that disciplinary learning and interdisciplinary learning strengthen one another is well established in the literature.

Seongsook Choi and Keith Richards, in their book on *Interdisciplinary Discourse* extensively discuss the rise of interdisciplines, as phenomena which emerge out of disciplinary and interdisciplinary developments. These are subject areas which are interdisciplinary by nature, or which bring multiple disciplines under one umbrella – for instance public health (which brings together disciplines including biology, psychology, geography, and others). [120] Interdisciplines are also discussed by Julie Thompson Klein, and raised as examples of the wide variety of ways in which disciplinarity and interdisciplinarity can interact. [121] Interdisciplines are not an essential element of a curriculum aiming to embed interdisciplinary learning, but they may be a useful tool, among others, for allowing the effective development of disciplinary learning alongside interdisciplinarity.

> **Element of Promising Practice 14**: To encourage interdisciplinarity and individual disciplines to mutually reinforce one-another; with interdisciplinary methods being used to develop deep and innovative disciplinary understanding – Interdisciplinarity and traditional disciplines should not be viewed as opposites, but should both be part of balanced curricula. There are many possible avenues for blending interdisciplinarity with disciplines, for example, the promotion of new interdisciplines and the use of subject-areas such as STEM.

When discussing the interactions between disciplines and interdisciplinarity it is also important to remember that not all disciplines are the same, and not all can be treated identically in relation to how they will interact with the aim of embedding interdisciplinarity in a curriculum. As Lyn. D English has suggested, interdisciplinarity in education should take an intelligent approach to the integration of disciplines. [122] Put differently, the intrinsic and individual nature of each discipline should be taken into account. This section will focus on STEM, with a particular emphasis on the role played by mathematics, as it is impossible to provide individual analysis for every relevant discipline in this short space.

---

[118] English, p.3.
[119] Bull and Dupuis, pp. 73-79; Stern *et al*.
[120] von Lengerke, T. 2006. Public Health is an Interdiscipline, and about Wholes and Parts: Indeed, Critical Health Psychology Needs to Join Forces. Journal of Health Psychology. 11(3), pp. 395-399.
[121] Klein, p. 5.
[122] English, p. 3

STEM – or science, technology, engineering, and mathematics – has been one of the longest-standing and most commonly-researched areas of disciplinary overlap, not least due to the perceived economic benefits of having a highly STEM-proficient workforce. However, despite its firm establishment as a term within education and research, STEM is not a fixed phenomenon. For example, there have been calls for arts to be integrated into STEM umbrella (creating STEAM), and even heritage-studies (STEAMH).[123] There are also numerous suggestions that have been made by authors researching the most effective means of integrating STEM – developing ideas such as teaching through the Big Ideas of Science, or using Interdisciplinary Science Inquiry (ISI).[124] Moreover, studies have also recognised that STEM integration does not always provide each of the individual components with equal benefit. For example, Lyn D. English has highlighted the need for engineering and mathematics outcomes from STEM education to be better researched, with the current risk that "the STEM acronym is often used in reference to just one of the disciplines, commonly science".[125]

Focussing on mathematics – as its position within STEM has been widely discussed in the literature – Brian Doig and Julian Williams have argued that mathematics' specific features require that its integration within STEM should be carefully considered. There is a danger that mathematics, rather than being given attention in its own right, becomes merely a tool or a language for the other elements of STEM.[126] Some studies have, using that concern as a premise, developed useful ways for advancing the standing of mathematics (often as part of STEM) in an integrated curriculum. Sylvia Celedón-Pattichis *et al*, for example, have described how mathematics can be made to feel more relevant, particularly to student demographic groups who do not often pursue mathematics beyond a compulsory level, by integrating the subject with image and video processing.[127] This builds bridges between relatively abstract mathematical concepts and elements of engineering to which students can more easily relate and find personal relevance. Alternatively, Fulvia Furinghetti and Annamaria Somaglia have demonstrated that incorporating the history of mathematics into the curriculum can boost interest in mathematics as a discipline, while also providing fertile ground for effective interdisciplinary learning.[128] A similar idea – which also borders on the idea of STEAM – is the previously described photography and mathematics integrated project described by Segovia *et al*.[129] Overall, these examples specifically describe methods for getting the most out of the integration of mathematics: by deploying interdisciplinarity but using this to also strengthen the standing of the discipline. However, the wider takeaway is that individual disciplines should be intelligently integrated in the process of developing interdisciplinary learning in the

---

[123] da Cristina Oliveira, pp. 234-245.

[124] For the Big Ideas of Science, see Eleftheria *et al*; for ISI see Nargund-Joshi and Liu. For emphasis on the importance of using real-world contexts for STEM education see Wang, H.H., Charoenmuang, M., Knobloch, N.A. and Tormoehlen, R.L., 2020. Defining interdisciplinary collaboration based on high school teachers' beliefs and practices of STEM integration using a complex designed system. International Journal of STEM Education, 7(1), pp. 1-17.

[125] English, p. 1.

[126] Ferri *et al*, pp. 25-37.

[127] Celedon-Pattichis, pp. 873-887.

[128] Furinghetti, F. and Somaglia, A., 1998. History of mathematics in school across disciplines. Mathematics in school, 27(4), pp. 48-51.

[129] Segovia *et al*, p. 138-169.

curriculum. As Svetlana Nikitina has argued, different disciplines lend themselves to slightly different approaches to interdisciplinarity.

> "For example, if the guiding epistemology in the interdisciplinary work is that of the humanities, then, I claim, the mode of connecting disciplinary material is likely to be contextualizing, or embedding the facts and theories in the cultural, historical, or ideological fabric. If the scientific method guides and sets the standard for integration, conceptualizing work typically takes place. Finally, if the spirit and mode of inquiry is that of the applied sciences or creative product/policy development, the integrative process will take the form of problem-based investigation of urgent or tangible issues". [130]

This three-part distinction between contextualising, conceptualising, and problem-based investigation is not the only way to strategically consider the inherent nature of disciplines when developing interdisciplinarity, but it is one interesting example.

> **Element of Promising Practice 15**: To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual nature of specific disciplines – As part of using interdisciplinary learning to strengthen disciplinary education, specific attention should be given to how interdisciplinarity interacts with the intrinsic and individual nature of each discipline being integrated. Specific approaches to contextualising, conceptualising, and using different types of problem-solving are examples of the type of guidance which may address the features of individual disciplines.

When considering the interaction between disciplines and interdisciplinarity, it is also important to consider the approaches taken by qualifications to ensure effective interdisciplinary learning and that the benefits also feed back into individual subjects. Baccalaureate qualifications can include within their structure, such as interdisciplinary projects that build on and integrate subject-specific knowledge. For example, the Advanced Placement (AP) Capstone is a two-year upper secondary diploma/baccalaureate-style programme offered in the US which combines study of four subjects alongside AP Seminar and AP Research, where the latter two are interdisciplinary courses. [131] In the AP Seminar specification, there are specific links made between the global topics/themes and discipline-specific content covered in AP subjects such

---

[130] Nikitina, S., 2006. Three strategies for interdisciplinary teaching: contextualizing, conceptualizing, and problem-centring. Journal of curriculum studies, 38(3), pp. 251-271.

[131] Both the AP Seminar and AP Research are structured around five "Big Ideas" (Question and Explore; Understand and Analyze; Evaluate Multiple Perspectives; Synthesize Ideas; and Team, Transform and Transmit). For the AP Seminar, students are assessed through a team project and presentation, an individual research-based essay and presentation, and an exam testing students' ability to explain and analyse and argument, and to read across a range of sources on a given theme to synthesise information and develop an evidence-based essay. For the AP Research, students plan and implement a research investigation, creating a portfolio and a 4000-5000 word paper. Students are assessed on their ability to establish arguments, select and use evidence, design research, analyse sources and evidence, understand context and perspective and communicate (engage the audience, apply appropriate writing conventions, collaborate and reflect).

as American history. These links demonstrate how interdisciplinary study can relate to subject-specific knowledge covered in the subject APs, and how subject-specific knowledge facilitates interdisciplinary skills and knowledge development. [132]

Moreover, the SQA Scottish Baccalaureate which focuses on arts, social sciences, and sciences, incorporates Advanced Highers in those subjects alongside an interdisciplinary project which draws upon subject-specific skills. The Social Sciences Baccalaureate has qualities similar to an interdiscipline, where several subjects are combined within the umbrella of social science, culminating in a social sciences interdisciplinary project. [133] Moreover, in its guidance for teachers, Pearson provides examples of projects for the Extended/Higher Project qualifications, which draw upon discipline-specific knowledge while integrating an interdisciplinary approach. [134]

3.10 Teacher Support and Collaboration

Last, but by no means least, among the list of significant themes with a heavy impact on the successful embedding of interdisciplinarity into a K-12 curriculum, is teacher support and collaboration. As was discussed in Section 3.3 of this literature review – The Value and Purpose of Interdisciplinary Learning – one of the key variables for successful interdisciplinarity in a school setting is teachers' knowledge about and enthusiasm for interdisciplinarity. [135] This section will address three linked issues which influence teachers' capacity to successfully encourage interdisciplinary learning in their classrooms: continuing professional development (CPD), teacher-teacher collaboration, and the prioritisation of time put aside in the curriculum schedule for teachers to work on interdisciplinary content and methods.

CPD is described by a wide range of sources as being one of the most important methods for ensuring that interdisciplinary learning is embedded effectively and coherently. At one level, there are some authors who have simply recognised and articulated the significant role that CPD plays in this area, for instance, Maria Cristina Oliveira da Costa and Antonio Manuel Dias Domingos. [136] Beyond this, some authors have also looked into what form the CPD should take. Mubarak K. Al Salami *et al* underscore the fact that CPD must be *continuous* – meaning that there is no quick or one-off effort that can secure effective interdisciplinary learning without being further revisited and refined. [137] Todd R. Kelley and J. Geoff Knowles describe an example of a 2-week summer PD workshop on STEM integration, which shows promising

---

[132] AP Board. 2020. AP Seminar. Course and Exam Description. Available at: https://apcentral.collegeboard.org/pdf/ap-seminar-course-and-exam-description.pdf?course=about-ap-capstone-diploma-program. [Accessed 2/12/2020].
[133] SQA. 2020. The Scottish Baccalaureate in Social Sciences. Available at: https://www.sqa.org.uk/sqa/48660.html. [Accessed 2/12/2020].
[134] Pearson Qualifications. About the Project Qualification. Available at: https://qualifications.pearson.com/en/qualifications/edexcel-project-qualification/teaching-support/links-with-subjects.html. [Accessed 2/12/2020].
[135] Al Salami, pp. 63-88.
[136] da Cristina Oliveira, pp. 234-245.
[137] Al Salami, pp. 63-88.

evidence of being valuable.[138] Moreover, a number of research studies have considered what should be the content of CPD for effective deployment of interdisciplinary learning. Barbara Nagle, for example, has indicated that CPD should help teachers to develop both content for interdisciplinary learning and to innovate effective approaches.[139] Margot and Kettler also emphasise the development of effective interdisciplinary pedagogy with CPD, while Hasni *et al* and Baillat and Niclot point out the potential to develop understanding of disciplines outside of one's specialism and to see how this knowledge of processes and logics is not a challenge to disciplinary expertise, but a valuable addition.[140] Thus, although the exact format and content of effective interdisciplinary CPD can vary, there is no doubt that it should be continuous and strategically incorporate the development of both pedagogic understanding and interdisciplinary content knowledge.

> **Element of Promising Practice 16**: To provide continuing professional development opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies – Professional development for teachers on the topic of interdisciplinary learning cannot be a one-off or done quickly, but should be a continuous effort to develop and improve. Specifically, teachers should be supported to learn new content areas (including developing understanding outside of their disciplinary specialism) and to discover valuable pedagogic approaches for the encouragement of interdisciplinary learning.

Along with CPD, collaboration between teachers is another theme that emerges on a regular basis within books and articles discussing effective methods for interdisciplinary learning. As Sarah Carrier *et al* have explained: in the context of interdisciplinarity, collaboration between teachers may involve "bringing together teachers with different areas of specialization and exposing one another to new content knowledge and instructional approaches".[141] This quote brings together two of the most significant areas that can be helpfully developed by teacher-teacher collaboration: new content knowledge and instructional approaches. On the latter of these, Selma Deneme and Selen Ada have described (in relation to effective interdisciplinary teacher collaboration in primary schools) how "teachers collaborate to invent more effective means of teaching by associating the subjects and activities of a school subject in the curriculum with other subjects".[142] Harris and Grenfell have made the same point about innovative instructional strategies in relation to language learning, and Kelly M. Winkelhake has explained how this can lead to positive student outcomes.[143]

Importantly, the academic literature does not assume that interdisciplinary collaboration between teachers is a straightforward exercise. The Pearson Extended Project Qualification provides an example of how project-based skills have been taught and developed in

---

[138] Kelley, T.R. and Knowles, J.G., 2016. A conceptual framework for integrated STEM education. International Journal of STEM Education, 3(1), p. 11.
[139] Nagle, pp. 144-147.
[140] Hasni *et al*, pp.144-180; Baillat and Niclot, pp. 170-207.
[141] Carrier *et al*, p. 425.
[142] Deneme and Ada, p. 885.
[143] Harris and Grenfell, pp.116-130; Winkelhake.

practice. [144] Teacher support materials are available to facilitate teacher collaboration and peer review when delivering the project-based learning in practice. Linking to the CPD discussed above, Choi and Richards imply that teachers might need support, in the form of training, in order to bridge the gaps between their disciplinary backgrounds. [145] Similarly, Kanphitcha Kodkanon et al have argued that for the collaboration to be effective, it must be developed around supportive and trusting frameworks, so it is not something that can be forced or under-resourced, while Smith and Karr-Kidwell emphasise the need for this collaboration to be seen as part of an ongoing school-wide learning process of which teachers are a key part. [146] An interesting potential structure for this collaboration is the communities of practice model. Pharo et al, for instance, describe how valuable this can be at developing innovation, helping teachers become enthusiastic about possible content areas, and generally providing the peer-to-peer support that enables effective interdisciplinary learning. [147] Those authors are specifically writing about a higher-education context, but there is no reason the same promising model could not be applied at K-12, and their description of the way that such a model maintains institutional autonomy (enabling flexibility) holds promise for an organisation with schools in different national and cultural contexts.

> **Element of Promising Practice 17**: To encourage and enable collaborative practices within schools which encompass teacher-teacher collaboration within an effective format but also involve a school-wide effort – Collaboration between teachers is a highly effective way of building innovative methods and developing knowledge of useful interdisciplinary content areas. For this collaboration to be enabled it should be a whole-school effort including all elements of a school's administration to support collaborative practices. Moreover, the format of that collaboration should be carefully considered – with the communities of practice model showing particular promise in helping teaching professionals to expose one-another to effective practices.

One challenge to teacher-teacher interdisciplinary collaboration which it is vital not to overlook is the shortage of time that many teachers face, and the difficulty of incorporating anything that could be perceived as additional workload. Hui-Hui Wang et al have made this point clearly in a recent study addressing STEM integration. [148] Promising practice clearly shows that it should be a school and organisational priority to put time aside for collaborative interdisciplinary curriculum planning. Hasni et al have found this to be one of the key takeaways from their extensive analysis of the deployment of interdisciplinary learning in the

---

[144] Pearson Qualifications. 2019. Pearson Edexcel Level 3 Extended Project. Available at: https://qualifications.pearson.com/en/qualifications/edexcel-project-qualification/level-3.html. [Accessed 2/12/2020].
[145] Choi and Richards.
[146] Kodkanon, K., Pinit, P. and Murphy, E., 2018. High-school teachers' experiences of interdisciplinary team teaching. Issues in Educational Research, 28(4), p. 967; Smith and Karr-Kidwell, p. 12, 18, 21.
[147] Pharo, E., Davison, A., McGregor, H., Warr, K. and Brown, P., 2014. Using communities of practice to enhance interdisciplinary teaching: Lessons from four Australian institutions. Higher Education Research & Development, 33(2), pp. 341-354.
[148] Wang et al, pp. 1-17.

school system of Quebec.[149] Nagle has also come to a similar conclusion, and Ann C. Howe & Jerry Bell emphasised the fact that concentrated time for curriculum development is vital to the success of an interdisciplinary curriculum.[150] Byrne Bull and Dupuis are perhaps clearest in recognising the very high demand placed on teachers' time, but nonetheless stating that interdisciplinary learning topics and methods should be a priority for PD days, and that common time must be timetabled for teachers to carry out the peer-to-peer collaboration that develops not only innovative methods but also the highly important enthusiasm for interdisciplinarity.[151]

> **Element of Promising Practice 18**: To put time aside in the curriculum which is explicitly for teachers to reflect and collaborate around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity – As time is such a valuable commodity for teaching professionals, it is important that collaboration and reflection on practice are not simply expected to fill curriculum gaps, but are explicitly planned-for with time set aside only for the development of interdisciplinary best practice. Having this time explicitly allocated for interdisciplinarity not only highlights that it is a curriculum priority, but also enables teachers to develop new content knowledge, effective pedagogies, and the highly important enthusiasm for interdisciplinary learning.

3.11 Conclusion

In conclusion, this literature review has brought together a wide array of academic literature with practical examples of how interdisciplinary learning is deployed around the world, in order to extract simple elements of promising practice.

In some cases, the promising practice has been relatively easy to identify. For instance, in the case of offering a clear and research-informed definition of interdisciplinarity, this was something where near-consensus exists in the academic literature and the high-quality examples of practice reflected the same themes (see EoPP 1 and 2). However, there were also cases where the promising practice was harder to extract due to either a lack of consensus or a shortage of high-quality research in the area in question. For example, it was evident from the academic literature that promising practice for interdisciplinary learning in the K-12 age spectrum is that interdisciplinarity should be consistently embedded, but that the nature of the integration and the concepts used should evolve (see EoPP 10). However, there is very little research that gives extensive detail on precisely how interdisciplinarity should be made age-appropriate throughout the K-12 spectrum. This is therefore one area that would

---

[149] Hasni *et al*, pp. 144-180.
[150] Nagle, pp. 144-147; Howe, A.C. and Bell, J., 1998. Factors associated with successful implementation of interdisciplinary curriculum units. Research in Middle Level Education Quarterly, 21(2), pp. 39-52.
[151] Bull and Dupuis, pp. 73-79.

benefit from further research and study, but it is not the only example of a theme or issue that could profit from further scrutiny from scholars of interdisciplinary education.

Some questions and issues which have been discussed in this literature review, may develop more specific promising practice in the coming years as further research is undertaken in these areas. These questions are therefore worth revisiting at periodic intervals, to monitor change and progress in promising practice:

- K-12 progression and age-appropriate interdisciplinarity. How exactly should interdisciplinary learning evolve over the K-12 cycle and what constitutes age-appropriate interdisciplinarity at each key stage of education?
- Impact on student outcomes. Although there are substantial indications that interdisciplinary learning leads to improved learner outcomes, this area would still benefit from further large-scale control-tested studies (though such large-scale studies are rare in K-12 education contexts).
- Interdisciplinary skills and competences. This is not an area that lacks existing research, but which requires further unpicking. What exactly are interdisciplinary skills and competences and how are these different or distinct from skills and competences which can be developed through disciplinary study?
- Assessment of interdisciplinarity. Further practical research into the methods of assessing interdisciplinary learning, and how this can be blended with disciplinary school-leaving qualifications would provide valuable information.
- How individual disciplines interact with interdisciplinary learning. Some subjects and some subject areas have received more study in the context of interdisciplinary learning than others. STEM has been fairly widely studied, but more research into how single traditional school subjects are likely to benefit (or potentially lose emphasis) in interdisciplinary curricula would be beneficial.

Beyond these issues which have been addressed to some extent in this literature review, there are also some themes which have been beyond the scope of this literature review, largely due to the fact that they are lacking the substantial level of discussion in theory and practice that would allow for analytical synthesis and the extraction of promising practice. These issues would also therefore benefit from further research,[152] but have not been discussed in this literature review:

- Interdisciplinarity and national/cultural context. To what extent is interdisciplinary learning easier to embed in certain national or cultural contexts compared to others, and what are the specific national/cultural hurdles that can stand in the way of effective deployment of interdisciplinary learning at K-12?[153]

---

[152] These areas could be further explored by the IB in different project formats, or these issues could be monitored more remotely by updating this literature review on, for example, a two-year rolling basis.
[153] Little research exists on this area for K-12 education, but there are some initial studies at the level of university teaching and academic research, which give an indication that this theme will continue to be explored. See, for example, Pischke, E.C., Knowlton, J.L., Phifer, C.C., Lopez, J.G., Propato, T.S., Eastmond, A., de Souza, T.M., Kuhlberg, M., Risso, V.P., Veron, S.R. and Garcia, C., 2017. Barriers and solutions to conducting large international, interdisciplinary research projects. Environmental management, 60(6), pp. 1011-1021; Ramaswami, A., Russell, A., Chertow, M., Hollander, R., Tripathi, S., Lei, S., Cui, S. and Nagpure, A.S., 2014. International, interdisciplinary education on sustainable infrastructure and sustainable cities: key concepts and skills. The Bridge, 44(3).

- Interdisciplinarity and special educational needs (SEN). What challenges does interdisciplinary integration create for SEN students, and what mitigation strategies will help to ensure that all students can gain the full benefits of interdisciplinarity in the K-12 curriculum?[154]
- Interdisciplinarity and student background (including socio-economic context). Although there are some limited examples of discussions of interdisciplinary learning in relation to students from disadvantaged or minority backgrounds, the question of what challenges different groups of students might face should be further explored.[155]

These are just a limited number of examples. Interdisciplinary learning has been researched for decades and implemented to different degrees across a wide array of international contexts. From this evidence, there are many areas of identifiable promising practice, of which 18 have been highlighted in this literature review. However, despite the many years it has been a feature of educational research, interdisciplinary learning is still a theme gathering pace and we can therefore expect to see promising practice continue to emerge at a quick rate in the coming years. As such, this literature review should be treated as a snapshot from a single point in time, and the elements of promising practice should be periodically reviewed.

3.12 Full list of Elements of Promising Practice

Element of Promising Practice 1: To deliver a coherent, research-informed definition of interdisciplinary learning, which is guided by the intended purpose of deploying interdisciplinarity – A definition of interdisciplinarity or interdisciplinary learning should be clearly expressed, coherent across all documentation that may be encountered by stakeholders, and should be based on research into interdisciplinary learning which has taken place in recent decades. There are many different possible aims and purposes behind the deployment of interdisciplinary learning, so the definition should reflect an active engagement with the chosen and intended purpose. The definition should ideally be found in an easy-to-locate resource (such as a glossary) but should also be coherent when referenced or developed in other locations within documentation.

Element of Promising Practice 2: To engage clearly and coherently with the differences and similarities between interdisciplinarity and other related terms such as multidisciplinarity and transdisciplinarity – Although there is not one fixed definition of terms such as interdisciplinarity, multidisciplinarity, and transdisciplinarity, there should be clear engagement with the overlaps and distinctions between the meanings of such ideas. This might be achieved by offering individual definitions of each term, or it may be appropriate to provide a lengthier discussion around the issue of integration and how this may differentiate between

---

[154] There are some suggestions that interdisciplinary teacher collaboration could be a powerful tool for bringing special educational needs teaching into important discussions with mainstream educators – see, for example, Hedegaard-Soerensen, L., Jensen, C.R. and Tofteng, D.M.B., 2018. Interdisciplinary collaboration as a prerequisite for inclusive education. European Journal of Special Needs Education, 33(3), pp. 382-395.

[155] The source used in this literature review which briefly engages with this issue is Celedón-Pattichis *et al*, who explore how interdisciplinary learning can engage the interests of students from backgrounds that are underrepresented in the study of mathematics.

such notions. These terms should not be used interchangeably within resources, as this has high potential to lead to confusion for stakeholders.

Element of Promising Practice 3: To ensure a significant level of teacher scaffolding to help students deploy disciplines and interdisciplinarity effectively – Whilst interdisciplinarity should enable student-led inquiry, it is essential that student-led interdisciplinary inquiry is intelligently scaffolded by teachers. For example, by strategically developing "hooks" in one subject that can be activated in others, or by carefully explaining how students are carrying out interdisciplinary work through the use of disciplinary knowledge.

Element of Promising Practice 4: To explicitly link interdisciplinary learning with other features of constructivist pedagogy, including concept-based teaching, student-led inquiry, collaboration, and authentic learning – At the level of stated aims and methods of teaching and learning, interdisciplinary learning should be explicitly described as part of a wider spectrum of progressive constructivist pedagogy. The ideas to link with interdisciplinarity include conceptual understanding, student-centred learning, inquiry, collaboration, learning structured around authentic and real-world issues, and awareness of other perspectives and cultures. It is important to link these pedagogic approaches at multiple levels, but this Element of Promising Practice focuses at the top level of the stated headline aims and approaches to teaching and learning.

Element of Promising Practice 5: To clearly articulate and communicate, to staff and students, the value and benefits of interdisciplinary learning – Understanding the value and benefits of interdisciplinary learning and developing enthusiasm in both staff and students, leading to more effective embedding of interdisciplinarity. The values and benefits which could be communicated include (but are not limited to) interdisciplinary learning's ability to support and develop other elements of constructivist pedagogy, the evidence of benefits to student understanding, improved engagement, and better preparedness for the nature of further/higher education and the world of work.

Element of Promising Practice 6: To promote the use of authentic problem-solving and interdisciplinary project-based learning as two key tools for developing interdisciplinarity in the classroom – Problem-solving and project-based learning are both closely linked to effective constructivist pedagogy, enabling student-led inquiry and authentic learning. Both are also key practical conduits for interdisciplinary learning, in which students can develop organic links between disciplines by addressing real-world problems and using their conceptual understanding to carry-out projects which cross the boundaries of the subjects they are studying.

Element of Promising Practice 7: To create sufficient flexibility in the curriculum for teachers to authentically link learning to student interests, and new research developments, and to reflectively develop best practice approaches – A curriculum with very high levels of prescribed content and teaching methods will not contain sufficient flexibility for teachers to tailor learning to student interests and new areas of exploration in research/industry – both of which are key areas for effective interdisciplinary learning to be developed. Moreover, if teachers are enabled to be flexible, they can develop innovative and promising practice approaches to interdisciplinarity through collaboration and personal development.

Element of Promising Practice 8: To encourage the use of a wide variety of multimodal sources, enabling students to build their own links between disciplines and explore knowledge areas – Multimodality posits "the notion that learning is not only a linguistic accomplishment, but is also linked to the dynamic interrelationship among the different semiotic modes of meaning, such as the linguistic, the visual, the gestural, the spatial or the audio mode, which individuals can draw on to derive and produce meaning" (Papadopolou and Avgerinou). Providing multimodal sources to students can enable them to develop their own interdisciplinary links in the process of developing understanding through the variety of different semiotic modes.

Element of Promising Practice 9: To show proactive engagement with the key challenges which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning – Proactively engaging with, and providing mitigation strategies for, some of the most common challenges facing interdisciplinary learning can help to bridge the divide between theory and practice. Challenges may include clashing logics/processes/concepts emerging in interdisciplinary discourse and pseudo-interdisciplinarity being embedded rather than genuine interdisciplinary learning. Suggested mitigation strategies may include CPD, explanation of how deep disciplinary learning can be integrated into interdisciplinarity (for example, through macro and micro concepts), and emphasising the conceptual bridges between disciplines rather than smaller issues such as terminological barriers.

Element of Promising Practice 10: To develop interdisciplinarity within an age-appropriate structure, with scope for development along the K-12 age continuum – Promising practice indicates that interdisciplinary learning is an age-appropriate pedagogy throughout the K-12 age spectrum. However, this does not mean that interdisciplinarity is a static phenomenon in K-12; it should evolve with students' abilities and academic needs. Special attention should be given to the use of concepts which are age-appropriate in complexity, and (following primary-level education) students should increasingly be made aware of how they are using disciplinary knowledge in order to develop interdisciplinary understanding. This does not mean than interdisciplinary themes should be phased out for older students.

Element of Promising Practice 11: To explain the link between interdisciplinarity and key skills and competences including communication, critical thinking, synthesis, and metacognitive awareness of perspectives – It is possible to view interdisciplinary thinking as a skill/competence in its own right, or as something requiring certain skills, or as a phenomenon giving rise to other desirable skills. It is not essential to define interdisciplinary learning's exact place within the process of skill/competence development, but it should be explained that specific core skills/competences are linked to interdisciplinary learning and should be developed/used alongside interdisciplinarity.

Element of Promising Practice 12: To take interdisciplinary learning into account in the design of assessment – Assessment should form a key part of how interdisciplinarity is integrated into the curriculum. Moreover, the nature of that assessment should reflect the key aims and processes underpinning the exact nature of interdisciplinarity described to students within curricula resources.

Element of Promising Practice 13: To link interdisciplinary assessment with conceptual understanding, disciplinary grounding, advancement through integration and critical awareness – The best exact format through which to carry out assessment of interdisciplinary learning may not have been settled by research, but there are several promising components which are likely to effectively assess the most desirable features of interdisciplinary learning. These are conceptual understanding (potentially linked to authentic contexts), a strong grounding in disciplinary knowledge, demonstration that interdisciplinarity is advancing the aim of the learning in a way that isolated disciplines would not, and critical awareness of how interdisciplinarity is being used and for what purposes.

Element of Promising Practice 14: To encourage interdisciplinarity and individual disciplines to mutually reinforce one-another; with interdisciplinary methods being used to develop deep and innovative disciplinary understanding – Interdisciplinarity and traditional disciplines should not be viewed as opposites, but should both be part of balanced curricula. There are many possible avenues for blending interdisciplinarity with disciplines, for example, the promotion of new interdisciplines and the use of subject-areas such as STEM.

Element of Promising Practice 15: To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual nature of specific disciplines – As part of using interdisciplinary learning to strengthen disciplinary education, specific attention should be given to how interdisciplinarity interacts with the intrinsic and individual nature of each discipline being integrated. Specific approaches to contextualising, conceptualising, and using different types of problem-solving are examples of the type of guidance which may address the features of individual disciplines.

Element of Promising Practice 16: To provide continuing professional development opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies – Professional development for teachers on the topic of interdisciplinary learning cannot be a one-off or done quickly, but should be a continuous effort to develop and improve. Specifically, teachers should be supported to learn new content areas (including developing understanding outside of their disciplinary specialism) and to discover valuable pedagogic approaches for the encouragement of interdisciplinary learning.

Element of Promising Practice 17: To encourage and enable collaborative practices within schools which encompass teacher-teacher collaboration within an effective format but also involve a school-wide effort – Collaboration between teachers is a highly effective way of building innovative methods and developing knowledge of useful interdisciplinary content areas. For this collaboration to be enabled it should be a whole-school effort including all elements of a school's administration to support collaborative practices. Moreover, the format of that collaboration should be carefully considered – with the communities of practice model showing particular promise in helping teaching professionals to expose one-another to effective practices.

Element of Promising Practice 18: To put time aside in the curriculum which is explicitly for teachers to reflect and collaborate around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity – As time is such a valuable commodity for teaching professionals, it is important that collaboration and reflection on practice are not simply expected to fill curriculum gaps, but are explicitly

planned-for with time set aside only for the development of interdisciplinary best practice. Having this time explicitly allocated for interdisciplinarity not only highlights that it is a curriculum priority, but also enables teachers to develop new content knowledge, effective pedagogies, and the highly important enthusiasm for interdisciplinary learning.

4. IB Resources Overview

4.1 Introduction

The aim of this IB resources overview is to explore the nature of IB resources, with the goal of understanding, generally, how interdisciplinarity is structured into IB programmes. To do so, this section will analyse IB resources which fall into a number of different categories:

- Cross-programme documents.
- From Principles into Practice documents.
- Subject guides.
- "Core" guides.
- Teacher Support Materials and other resources.
- Definitions of interdisciplinarity and the family of related terms.
- "Curriculum components". This includes the teaching and learning curriculum components which are presented in the form of structured frameworks, i.e. the Learner Profile attributes, the Approaches to Teaching principles, and the Approaches to Learning skills.

When all of the different resource-types have been explored, this section will also take a closer look at where definitions of "interdisciplinarity" (and the related family of terms) are found within IB resources. This aspect of the overall audit will also be revisited in the application of the benchmarking tool, but it is an important component of the general resource overview. The location and consistency of definitions provides a roadmap for understanding how IB programme resources aim to articulate their position in relation to the concept of interdisciplinarity.

This IB Resources Overview begins by examining different resource types from a bird's eye perspective (to understand the general landscape of how interdisciplinarity may be described in IB resources). Following this top-level examination, analysis becomes more granular as the detailed nature of curriculum components and definitions are closely explored.

4.2 Cross-Programme Documents

Cross-programme documentation comprises material such as: *What is an IB Education?*, *What is an IB Education? Support Material*, and *Programme Standards and Practices*. These documents provide a summary of the IB programmes' broader educational philosophy and what it hopes to instil in its learners. Using assorted examples and illustrations, the cross-programme documents discuss how the various aspects of the IB's founding principles could be implemented within schools. Each one of the documents tends to focus on a different, although interrelated, aspect of IB programmes and their realisation in practice, with material covering "planning, implementation, development and evaluation". [156]

The cross-programme documents do not contain specific sections dealing exclusively with interdisciplinary learning. Instead, there is a tendency for the concept of interdisciplinarity to be incorporated into the documents as something related to the different components of planning, teaching, and assessing the IB programme.

Aside from the IB Learner Profile which is included in all three of the cross-programme documents (and indeed at the start of almost all IB resources in pdf format), there is a slight tendency to iterate interdisciplinarity more in the material relating to the PYP than to other programmes. This is evident in the *Programme Standards and Practices* document. For example, in a section outlining the design of the curriculum, item PYP 1 states that: "The school designs a programme of inquiry that consists of six units of inquiry – one for each transdisciplinary theme – at each year or grade level". [157] Elsewhere, the sections most likely to feature references to interdisciplinary learning are those that discussed: the contents of the curriculum, the Theory of Knowledge (TOK) course in the DP, and the principle of international-mindedness. Concerning the curriculum, interdisciplinarity is usually referred to as a means of cohering knowledge from the different subject branches. Regarding the TOK course, interdisciplinarity is articulated as a means of promoting critical self-awareness in students through an exploration of the differing methods of inquiry of each subject discipline. In the context of sections exploring international-mindedness and the values underpinning an IB education, interdisciplinarity is articulated more as a component of the IB's broader educational ethos which seeks to transect boundaries of various types (for example, cultural, geographical, and national borders). The cross-programme documents also reference notions frequently associated with interdisciplinarity such as constructivism and student-focused learning.

An illustrative example of a section which implicitly references interdisciplinary learning is provided by the *Programme Standards and Practices* document. Located in a segment outlining the recommended approaches to teaching, article 4.1 states that: "Teachers collaborate to ensure a holistic and coherent learning experience for students in accordance with programme documentation". [158] With the emphasis on holism and coherence extending across the teaching of the syllabus, it is implied that different subjects are connected in an interdisciplinary manner. A further example, from *What is an IB education? support material*,

---

[156] *Programme Standards and Practices*, p. 1.
[157] *Programme Standards and Practices*, p. 13. For the differences between transdisciplinarity and interdisciplinarity in the IB see section 4.8, below.
[158] *Programme Standards and Practices*, p. 17.

relates to elaborations on the notion of international-mindedness. In this context the document references constructivism, a concept frequently associated with interdisciplinarity: "in its most constructivist sense, understanding international-mindedness involves an interpretation that is necessarily filtered through cultural and contextual frames of reference". [159]

In general, all of the cross-programme documents contain both explicit and implicit discussions of interdisciplinarity, although in varying proportions. The *Programme Standards and Practices* document, from a top-level scoping, appears to contain the highest number of references to interdisciplinarity, both explicit and implicit, as it charts in detail the criteria of the IB programme. The *What is an IB education?* document also incorporates interdisciplinarity into its conceptual framework, referencing the term (explicitly and implicitly) in the context of attributes which the IB educational programme attempts to promote in students, as a broader educational ethos of the organisation, and as an integrating or cohering concept when discussing the IB curriculum.

Extracted Highlights (4.2)

- The concept of interdisciplinarity is incorporated into IB cross-programme documents through explicit or implicit discussions, though without containing specific sections dealing exclusively with interdisciplinary learning. The concept is often related to the different components of planning, teaching, and assessing the IB programme.
- Throughout cross-programme documentation, interdisciplinarity is articulated as a component of the IB's broader educational ethos.
- In cross-programme documentation interdisciplinarity is often associated with concepts such as constructivism, international mindedness, and holistic, inquiry-based, and student-focused learning.

4.3 From Principles into Practice

The IB From Principles into Practices (FPIP) documents are intended as a resource for IB staff that "provides guidance to teaching and learning" for all programmes. [160] To this end, the MYP, DP, and CP programmes each have a single corresponding FPIP document, whilst the PYP has four such FPIP documents: one providing an overview of the programme, one focusing on the learner, one directed to the learning community, and one outlining the approaches to learning and teaching. As stated in the FPIP documentation, the guides are designed to be accessible to all IB staff working in institutions that offer IB programmes.

Three of the PYP FPIP documents contain sections specifically dealing with transdisciplinary learning: *The Learning Community*, *Overview*, and *Learning and Teaching*. The theme of transdisciplinary learning tends to be connected to collaborative learning in *PYP: FPIP – The Learning Community*: "Transdisciplinary learning cannot happen without collaboration across disciplines. The key aim of collaboration is to: fuse knowledge from a number of different

---

[159] *What is an IB education? support material*, p. 5.
[160] *DP: From Principles into Practice*, p. 1.

disciplines and engage with stakeholders in the process of generating knowledge".[161] The section covering transdisciplinary learning in *Overview* document discusses transdisciplinarity more in relation to the curriculum framework. For example, a section in the introduction states that "PYP schools strive towards deeper implementation of transdisciplinary learning in their curriculums and communities by committing to a foundational set of principles found in Programme standards and practices".[162]

The sections in *PYP: FPIP – Learning and Teaching* that cover transdisciplinarity tend to elaborate on the theoretical background of the concept in somewhat more detail. For example, the document draws upon various texts to construct a working definition of the terms "transdisciplinarity", "interdisciplinarity", and "multidisciplinarity". The former is distinguished from the latter two terms by way of its said applicability to real-world contexts: "transdisciplinarity is […] distinct from multidisciplinarity and interdisciplinarity because of its goal, the understanding of the present world, which cannot be accomplished in the framework of discipline research".[163] None of the other MYP, DP, and CP FPIP documents contain separate sections explicitly addressing interdisciplinary learning.

The sections of the FPIP documents that are most likely to reference interdisciplinarity implicitly are those relating to the following topics: technology, curriculum planning, connecting communities, language teaching and acquisition, transition between programmes, approaches to teaching and learning, TOK, CAS, and assessment criteria. Some of these themes, where they are referenced in conjunction with interdisciplinarity, are fairly equally distributed throughout the different FPIP documents. For example, references to collaborative curriculum planning, or technology and interdisciplinarity, appeared in many of the different FPIP documents. Sometimes the three areas were all connected as in *MYP: FPIP*, which seeks to develop technological literacy through working "collaboratively to develop technology concepts and tools across disciplines".[164] Other topics tend to be more specific to certain programme FPIP documents. For example, references to approaches to teaching and learning and interdisciplinarity are principally situated in PYP and MYP FPIP documents. In some instances *CP: FPIP* implies interdisciplinarity in discussions of transferable skills: "In this course the emphasis is on skills development for the workplace and those skills needed to navigate higher education and society, knowing that such skills are transferable and can be applied in a range of situations".[165] Although this is not an explicit reference to interdisciplinarity, the focus on transferable skills may imply movement between disciplinary boundaries.

An illustrative example of an implicit reference to interdisciplinary learning is found in *PYP: FPIP – Overview*. In a section that explores learning and teaching in the PYP programme, constructivism is linked to an ethos of collaborative and holistic study: "Informed by constructivist and social-constructivist learning theories, the emphasis on collaborative inquiry and integrative learning honours the curiosity, voice, and contribution of the students".[166] Similarly, sections of the FPIP documents focusing on curriculum planning can implicitly

---

[161] *PYP: FPIP – The Learning Community*, p. 29.
[162] *PYP: FPIP – Overview*, p. 3.
[163] *PYP: FPIP – Learning and Teaching,* p. 2.
[164] *MYP: FPIP*, p. 135.
[165] *CP: FPIP*, p. 51.
[166] *PYP: FPIP – The Learning Community*, p. 39.

incorporate a holistic, interdisciplinary perspective, as in the following extract from the DP FPIP document: "A key purpose of the written curriculum is to provide improved and more coherent opportunities for students and, in turn, teachers to use cross-disciplinary elements (for example, education for citizenship, outdoor adventure and experiential education) as vehicles for learning across curricular areas and subjects".[167]

In summary, the FPIP documents incorporate both implicit and explicit references to interdisciplinarity. The PYP FPIP documents are the most likely to make direct references to disciplinary integration. Within these PYP documents, there are specific sections examining transdisciplinarity as a concept and a substantial body of literature is sourced on the topic. There is a fair amount of variation relating to the degree to which references are made to interdisciplinarity between the FPIP documents of the various programmes. The PYP FPIP documents focus on the term "transdisciplinarity" and in a section outlining the IB programme differences, transdisciplinarity is linked to the PYP, interdisciplinarity connected with the MYP and multidisciplinarity associated with the DP and CP.[168]

Extracted Highlights (4.3)

- There is a fair amount of variation relating to the level of integration of references to interdisciplinarity between the FPIP documents of the various programmes, incorporating both implicit and explicit references.
- The PYP FPIP documents include dedicated sections exploring transdisciplinarity, as this is a key pedagogical approach in the PYP. The *PYP: FPIP – Learning and Teaching* document also provides explicit definitions of the terms "transdisciplinarity", "interdisciplinarity", and "multidisciplinarity".
- The FPIP documents often implicitly refer to interdisciplinarity in relation to the topics of technology, curriculum planning, connecting communities, language teaching and acquisition, transition between programmes, approaches to teaching and learning, TOK, CAS, and assessment. It is also related to constructivist, holistic, collaborative, and inquiry-based learning.

4.4 Subject Documentation

The IB subject guide documents are produced as a resource for teachers to assist in the "planning, teaching and assessment of the subject in schools".[169] The documents are also intended to serve as a means through which teachers can inform students and parents about the particular subject. The MYP documents relate to subject-groups, whereas the DP/CP guides refer to subjects, reflecting the respective curriculum framework in each of the courses. The PYP does not have specific subject guides, due to its transdisciplinary structure. In the PYP, the lengthy FPIP documents serve to provide some of the information that is developed in subject guides in other IB programmes.

---

[167] *DP: FPIP,* p. 7.
[168] *PYP: FPIP – Learning and Teaching,* p. 3.
[169] *DP: Language B Guide*, p. 1.

Rather than containing specific sections relating to interdisciplinary learning, the subject guides tend to reference interdisciplinarity as a concept connected to other aspects of the IB programme. Some of the themes that are frequently associated with interdisciplinarity include: Theory of Knowledge (TOK) in the DP, conceptual understanding, and the planning and coherence of the curriculum. A slight exception to this is that the MYP subject guides often include a single page discussing interdisciplinary learning; these parts of the subject guides reference interdisciplinarity as a notion linked to the subject under discussion. For example, the *MYP: Mathematics Guide* provides practical examples of how the teaching of mathematics could be interdisciplinary: "MYP mathematics offers many opportunities for interdisciplinary teaching and learning. Possible interdisciplinary units in this subject group could include inquiries into: collecting and analysing statistical data in physical and health education classes, applying geometry knowledge in design projects, investigating the links between musical theory, and mathematical sequences".[170] The subject guide document that is unlike all others in relation to interdisciplinary learning is *MYP: Fostering Interdisciplinary Learning in the MYP*. This document unsurprisingly makes consistent and explicit reference to interdisciplinary learning.

The parts of the subject guides that appear most likely to mention interdisciplinarity are those which refer to: key concepts and conceptual understanding, links to TOK in the DP, curriculum planning, and occasional sections discussing the allocation of teaching hours and materials. *DP: Language B Guide* explains, "the explicit integration of conceptual understanding into the curriculum focuses on 'powerful organizing ideas that are relevant across subject areas'".[171] Regarding links to TOK, interdisciplinarity is frequently employed as a means of facilitating metacognition through exploration of the methods of inquiry used in the different subject disciplines. For example, the *DP: Theatre Guide* states (in a section considering TOK in relation to theatre) that "the arts subjects complement TOK ethos by revealing interdisciplinary connections and allowing students to explore the strengths and limitations of individual and cultural perspectives".[172] In the sections of the subject guides outlining the distribution of teaching hours, it is sometimes envisaged that interdisciplinary learning will be more time intensive. Consequently, these parts of the subject guides may recommend apportioning more teaching hours to make interdisciplinarity feasible: "in practice, more time is often necessary to meet subject-group aims and objectives and to provide for the sustained, concurrent teaching that enables interdisciplinary study".[173]

An illustrative example of an implicit reference to interdisciplinary learning is found in the *DP: Mathematics: Applications and Interpretation Guide*. In a subsection of the introduction, one of the stated aims of the mathematics course is to enable students to "take action to apply and transfer skills to alternative situations, to other areas of knowledge and to future developments in their local and global communities".[174] Interdisciplinarity is often associated with the transferability of knowledge and skills to new contexts. Similarly, the *MYP: Language and Literature Guide* implicitly references interdisciplinarity in the context of transferring linguistic abilities to new settings and environments. In a section that outlines a plan for the progression of the learning objectives, students are encouraged to "engage with and explore an increasing

---

[170] *MYP: Mathematics Guide*, p. 12.
[171] *DP: Language B Guide*, p. 23.
[172] *DP: Theatre Guide*, p. 7.
[173] *MYP: Mathematics Guide*, p. 14.
[174] *DP: Mathematics: Applications and Interpretation Guide*, p. 20.

range and sophistication of literary and informational texts and works of literature extending across genres, cultures and historical periods. These texts will also provide models for students to develop the competencies to communicate appropriately and effectively in an increasing range of social, cultural and academic contexts". [175]

Broadly speaking, the IB subject guide documents incorporate interdisciplinarity as both an implicit and explicit concept. Interdisciplinary learning in the subject guides tends to be referenced as both part of a broader guiding ethos of the curriculum and as a concrete aspect of teaching and student assessment requiring the provision of resources.

Extracted Highlights (4.4)

- The subject guides tend to reference interdisciplinarity as a concept connected to other aspects of the IB programme rather than having sections dedicated to discussing interdisciplinarity. The only subject guide which provides consistent and explicit references to interdisciplinarity is *MYP: Fostering Interdisciplinary Learning in the MYP*. Other MYP subject guides often include references to interdisciplinarity as a notion linked to the subject under discussion, with some subject guides providing practical examples of interdisciplinary content.
- Across all IB programmes, the parts of the subject guides most likely to mention interdisciplinarity are those which refer to: key concepts and conceptual understanding, links to TOK in the DP, curriculum planning, and occasional sections discussing the allocation of teaching hours and materials. In the sections of the subject guides outlining the distribution of teaching hours, it is sometimes envisaged that interdisciplinary learning will be more time intensive.
- Across all programmes, subject guides often provide implicit references to interdisciplinarity through links to the transferability of knowledge and skills to new contexts.

4.5 "Core" Resources

According to how the term "core" is used across IB programme curricula, only the DP and CP have a curriculum core. In the DP this is comprised of Theory of Knowledge (TOK), Creativity, Activity, Service (CAS), and the Extended Essay. In the CP, the core comprises of the Reflective Project, Language Development, Service Learning, and Personal and Professional Skills. Although these are the only parts officially named as cores in the IB, there are also parts of the PYP and MYP curricula structure which resemble the role played by the core in the DP and CP (compulsory elements of the curriculum which sit outside of subjects but are linked to them, with a focus on holistic and skill development). In the PYP, a similar position is held by the Exhibition, and in the MYP, a similar position is held by projects (the community project and the personal project). Most of these "core" components (with the exception of the PYP Exhibition, which is detailed in the programme FPIP) have dedicated guides which describe how they should be undertaken and how they interact with the rest of the programme.

---

[175] *MYP: Language and Literature Guide*, p. 9.

The "core" guides do not generally have sections which are explicitly dedicated to explaining the link between those parts of the curriculum and interdisciplinary learning. However, those resources often contain sections which imply a link or tangentially relate to interdisciplinarity. The exception to this rule is *DP: Extended Essay Guide* which does contain sections explicitly describing the interdisciplinary world-studies option. In other core guides, interdisciplinarity might be implied by the explanations of how links should be formed between the core and individual subjects. For example, in *DP: CAS Guide*, the section named "CAS and the Diploma Programme" explains how each different subject group could be linked to CAS in a way that would be likely to transcend disciplinary boundaries.[176]

Overall, the "core" documents do not always contain sections dedicated to explaining their content *explicitly* in relation to interdisciplinary learning. However, by exploring how links can be made between the "core" and multiple subject areas in the curriculum, a level of integration across a programme is often implied.

Extracted Highlights (4.5)

- Only the DP and CP have an officially named curriculum "core", whereas some sections of the PYP and MYP curricula structures resemble the role played by the core in the DP and CP. This include the Exhibition in the PYP and the projects (the community project and the personal project) in the MYP.
- The "core" resources do not always provide dedicated sections explicitly explaining the link between those parts of the curriculum and interdisciplinary learning. Most references to interdisciplinarity included in the "core" guides are implicit and focus on the connections that can be made between the curriculum "core" and the different subject areas of each programme.
- The *DP: Extended Essay Guide* is one of the only "core" resources that contains sections explicitly focusing on interdisciplinarity, through the world-studies option.

4.6 Teacher Support Materials and other Resources

Teacher Support Materials (TSMs) aim to provide teachers with additional guidance in relation to the teaching of a specific course, or with a specific aspect of the curriculum, in order to reflect the aims and objectives of IB programmes.[177] TSMs are available for courses across all IB programmes and are targeted to both experienced and new teachers. In addition, TSMs aim to support teachers in developing an understanding of the demands of different parts of the curriculum in order to successfully design, structure, plan, and deliver IB programmes.[178] TSMs can be found in the IB Programme Resource Centre under each programme either in the format of html or pdf.

---

[176] *DP: CAS Guide*, p. 5.
[177] *DP: Language B TSM.*
[178] *DP: Mathematics Applications and Interpretation TSM.*

The IB Programme Resource Centre includes a wide range of other resources in combination with the TSMs which aim to support teachers to plan teaching and develop their knowledge and skills, not only in relation to subject knowledge but also professional development regarding teaching practices, approaches, and assessment methods. Examples of other resources available to provide additional support include: supporting videos; research or evaluation reports and studies; glossaries; assessment material and resources; podcasts; webinars; workshops; professional development resources; specimen assessment resources; unit planners; further guidance documents; curriculum reviews and additional curriculum material; subject reports; session-specific material; and cross-session resources.

As there is such a variety of TSMs and other resources, it is unsurprising that in some cases there are sections or subsections of documents which explicitly discuss interdisciplinary learning. However, this is not a common pattern among such resources. Instead, these explicit sections only appear in resources with an inherently interdisciplinary focus. These include, for example, *MYP: Interdisciplinary Teaching and Learning in the MYP TSM* and *MYP: Interdisciplinary inquiry A – Teacher resource pack*.

In TSMs and other resources which do not have a sole focus on interdisciplinary learning, there are some sections or subsections which may include substantial reference to subject integration but in a more implicit manner. For example, the PYP resource *Multiliteracies*, a TSM, explains multimodality and multiliteracy in a way that clearly implies they can be used to foster transdisciplinarity. "Intentionally planning with multimodal texts creates the space and opportunity to value cultural diversity, whilst exploring connections among different modes of meaning-making".[179] As this report's literature review established, this type of reference to using multimodality contains at least implicit links to effective interdisciplinary learning.

Overall, the large number of IB resources which could be classified as TSMs, and the many others on the Programme Resource Centre which do not fall under a simple resource category, undoubtedly contain both implicit and explicit reference to interdisciplinary learning. Rarely is interdisciplinarity or transdisciplinarity the sole focus of those resources, but it is not uncommon for there to be an implicit or tangential link found in at least one section of TSMs and other resources.

---

[179] *PYP: Multiliteracies TSM*.

- TSMs and other resources often provide sections or subsections which explicitly discuss interdisciplinary learning, however there is not a common pattern of references to interdisciplinarity in these resources.
- The TSMs and other resources which most explicitly focus on interdisciplinarity are *MYP: Interdisciplinary Teaching and Learning in the MYP TSM* and *MYP: Interdisciplinary inquiry A – Teacher resource pack*.
- Some other TSMs and other resources (which do not primarily focus on interdisciplinary learning) often include sections or subsections which might implicitly refer to interdisciplinary elements. For example, the PYP resource *Multiliteracies* explains multimodality and multiliteracy, providing implicit references to effective ways of embedding interdisciplinary learning.

4.7 Definitions in IB Resources

This section of the audit aims to identify where definitions of "interdisciplinary", "multidisciplinary", and "transdisciplinary" learning can be found across IB documents. In order to identify these definitions, Ecctis considered resources from all four IB programmes.

4.7.1 Interdisciplinarity

Some IB programme-specific documents provide definitions of interdisciplinarity as well as phrases and statements which (although not strictly definitions) give some level of definitional descriptions of this term. A clear definition of interdisciplinarity presented in the PYP documents is that interdisciplinarity refers to the connections and the transfer of knowledge, methods, concepts and models that link one discipline to another. According to this, in interdisciplinarity the disciplinary boundaries between the subjects may be vague and transparent, and the transfer of knowledge can sometimes create a new discipline or area of knowledge. This definition of interdisciplinarity is presented in the form of paragraph that reviews relevant literature and outlines the key elements of interdisciplinary learning compared to transdisciplinarity and multidisciplinarity. According to this:

> "Interdisciplinarity is concerned 'with the links and the transfer of knowledge, methods, concepts and models from one discipline to another' (Padurean and Cheveresan 2010: 128). Disciplinary boundaries may blur. The transfer of knowledge can sometimes yield a new discipline. For example, when the disciplines of nuclear physics and medicine came together, they yielded a new treatment called chemotherapy (Choi and Pak 2006). Again, in everyday analogy, interdisciplinarity is represented as stew, where ingredients are partially distinguishable (Choi and Pak 2006)".[180]

---

[180] *PYP: FPIP – Learning and Teaching*, p. 2.

In addition, definitions of interdisciplinarity are evident in the MYP as this is the programme that explicitly embraces interdisciplinary (as differentiated from transdisciplinary or multidisciplinary/disciplinary) approaches to teaching, learning, and assessment. MYP documentation defines interdisciplinarity as the combination of two or more academic disciplines where interdisciplinary learning can be developed both within and between/among different subject groups. According to the *MYP: FPIP*, interdisciplinary assessment of students' knowledge and skills takes the form of a single assessment where two or multiple disciplines or areas of learning are being assessed. This definition of interdisciplinarity is presented as an official definition in the glossary of *MYP: FPIP*:

> "Interdisciplinarity: Combining or involving two or more branches of learning or fields of academic study. In the MYP, interdisciplinary study can be developed both within and between/among subject groups."

> "Interdisciplinary assessment: Combining or involving two or more branches of learning or fields of academic study within a single assessment. In the MYP, interdisciplinary study can be developed both within and between/among subject groups. MYP external interdisciplinary assessment always involves multiple subject groups." [181]

Furthermore, additional MYP documentation presents a definition of interdisciplinarity according to which, in interdisciplinary learning, students study more than one discipline in order to create new, integrated understanding. This definition of interdisciplinarity is documented in *MYP: Fostering interdisciplinary teaching and learning in the MYP* in a tabular format including information on interdisciplinarity, the definition of the term, examples of the use of the term, as well as a visual representation of the term in an image. According to that document, interdisciplinarity can be defined as:

> "Working between more than one discipline, blurring boundaries. Interaction among disciplines to achieve new, integrated understanding". [182]

Interdisciplinary approaches are also implemented in the DP. The programme's documentation provides a definition of interdisciplinarity according to which interdisciplinary subjects integrate knowledge, tools and skills from different disciplines and study fields. More specifically:

> "DP defines interdisciplinary courses as those that integrate knowledge, tools and skills from different subject groups". [183]

Definitions of interdisciplinarity are also evident in definition-like phrases, passages, and descriptions throughout IB programme-specific documentation. According to *MYP: Fostering interdisciplinary teaching and learning in the MYP*, interdisciplinary learning can take place between different subject groups, as well as between different disciplines within a subject

---

[181] *MYP: FPIP*, p. 127.
[182] *MYP: Fostering interdisciplinary teaching and learning in the MYP*, p. 9.
[183] *DP: FPIP*, p. 61.

group. [184] This type of learning encourages students to develop broader perspectives on complex issues while enabling deeper levels of analysis, synthesis and creation of meaningful connections between different areas of knowledge. [185] More specifically, in the MYP, interdisciplinary learning is generally described as the process by which students aim to understand bodies of knowledge and modes of thinking from two or more disciplines or subject groups and integrate them to create a new understanding. MYP documents provide many definition-like passages which are aligned to the glossary definition of interdisciplinarity and are related to the development of students' interdisciplinary perspectives. Official-looking definitions and the definition-like passages contain the same ideas and content regarding the definition of interdisciplinarity in the MYP. However, the definition-like descriptions and passages provide more contextual information around the definitions by placing them into the IB context in more detail. MYP documents provide definitional descriptions of interdisciplinarity giving additional information on key elements of interdisciplinary teaching and learning such as the following:

> "Interdisciplinary teaching and learning is grounded in individual subject groups and disciplines, but extends disciplinary understanding in ways that are:
> integrative— bringing together concepts, methods, or modes of communication from two or more subject groups, disciplines, or established areas of expertise to develop new perspectives
> purposeful—connecting disciplines to solve real-world problems, create products or address complex issues in ways that would have been unlikely through a single approach". [186]

Additionally, definition-like phrases, passages and descriptions are evident in the DP documentation. According to DP: *FPIP*, the programme allows the development of interdisciplinary learning where students can create links between different academic disciplines and fields of knowledge in order to facilitate students' interdisciplinary understanding through teaching of interdisciplinary perspectives in curriculum areas such as Theory of Knowledge (TOK) and the Extended Essay. According to *DP: FPIP*:

> "concurrency of learning, which is a vital organizational component of the DP, provides one important means of supporting interdisciplinary learning. Students are expected to make connections between different academic disciplines and not to study subjects in isolation from each other. The possibility to explore similar topics concurrently and to transfer tools or concepts from one subject to another may enable interdisciplinary understanding". [187]

Additionally, *CP: FPIP* provides one definition-like description of interdisciplinarity related to the use of concepts in interdisciplinary teaching:

> "Teaching through concepts encourages teachers to promote a broad approach to education that can encompass many ways of thinking, inspire a variety of

---

[184] *MYP: Fostering interdisciplinary teaching and learning in the MYP*, p. 9.
[185] *MYP: FPIP*, p. 127.
[186] *MYP: Individuals and Societies Guide*, p. 12.
[187] *DP: FPIP*, p. 57.

experiences, and open doors to exciting and highly relevant interdisciplinary and transdisciplinary learning." [188]

The review of the DP and CP FPIPs indicated these documents provide definition-like passages around interdisciplinarity which contain the same ideas around this term as the PYP and MYP documents discussed above.

4.7.2 Multidisciplinarity

Definitions of multidisciplinarity are presented in the PYP, MYP and (to a lesser extent) DP documentation. According to *PYP*: *FPIP,* multidisciplinarity is considered the approach where students learn about a specific topic through the use of more than one academic discipline at the same time. In multidisciplinary learning, the boundaries between the different disciplines remain and the students focus on developing the subject-based knowledge and skills by using different disciplines. This definition of multidisciplinarity is presented in the PYP documentation in the format of a paragraph that outlines the definition, characteristics of multidisciplinarity, and its differences from interdisciplinarity and transdisciplinarity:

> "Multidisciplinarity is concerned with studying a topic 'in not just one discipline only, but several at the same time' (Nicolescu 2014: 187). Multidisciplinary learning begins and ends with the subject-based content and skills (Beane 1997). The boundaries among the subjects remain. Using an everyday analogy, multidisciplinarity is represented as a mixed salad where the ingredients remain separate and distinguishable (Choi and Pak 2006)." [189]

Additionally, MYP documentation presents a definition of multidisciplinarity according to which multidisciplinary learning focuses on the study of multiple disciplines while at the same time maintaining boundaries between different fields of study. This definition of multidisciplinarity is documented in a tabular format including information of the term of multidisciplinarity, the definition of the term, examples of the use of the term, as well as a visual representation of the term in an image. According to *MYP: Fostering interdisciplinary teaching and learning in the MYP*, multidisciplinarity can be defined as:

> "Working with multiple disciplines, maintaining boundaries. Multiple but distinct disciplinary perspectives that explore a topic, issue or idea (concurrent or sequential)". [190]

DP documentation provides one definition-like phrase on multidisciplinarity without providing a clear definition of this term in comparison with the PYP and MYP documentation. More specifically, *DP: FPIP* highlights that the DP allows students to make connections between multiple subjects by facilitating the development of multidisciplinary approaches:

---

[188] *CP: FPIP*, p. 73.
[189] *PYP: FPIP – Learning and Teaching*, p. 2.
[190] *MYP: Fostering Interdisciplinary Teaching and Learning in the MYP*, p. 8.

"Opportunities for cross-curricular connections between subjects and subject groups in the DP may result in multidisciplinary approaches".[191]

Our review of CP documentation did not reveal any references or information around the definition of multidisciplinarity.

4.7.3 Transdisciplinarity

IB documentation of the PYP, MYP, DP, and CP provides some level of definitions of transdisciplinarity. In the PYP, a definition of transdisciplinarity is presented in the format of a paragraph which outlines the key elements of transdisciplinary learning and its differences from interdisciplinary and multidisciplinary learning. According to *PYP: FPIP*:

"Transdisciplinarity 'concerns that which is at once between the disciplines, across the different disciplines, and beyond all disciplines' (Nicolescu 2014: 187). Nicolescu notes that a key imperative of transdisciplinary learning is to unite knowledge for the understanding of the present world. In transdisciplinarity, the disciplines are no longer distinguishable, like the ingredients in a cake, and the result is something completely different (Choi and Pak 2006)."[192]

In PYP documentation, transdisciplinarity is defined as an "approach to learning and teaching that is integrated – going across, between and beyond subjects".[193] More specifically, as transdisciplinary teaching and learning is a key feature of the PYP, the programme's documentation reviews the academic literature on the definitions of transdisciplinarity and presents them as definitional passages and descriptions of the term. According to *PYP: FPIP*:

"Transdisciplinarity transcends subjects. It begins and ends with a problem, an issue or a theme. Students' interests and questions form the heart of transdisciplinary learning. It is a curriculum-organizing approach where human commonalities rise to the top without regard for subject boundaries. Subjects become an instrument/tool/resource to explore a theme, problem or concept in depth. The result is a different or new organizing framework (Beane 1997; Klein 2006)".[194]

Definitions of transdisciplinarity are also evident in MYP documentation. According to the definition there, through transdisciplinary approaches students can learn across and beyond individual study fields in order to explore a topic of interest. This definition of transdisciplinarity is documented in *MYP: Fostering interdisciplinary teaching and learning in the MYP* in a tabular format including information on transdisciplinarity, the definition of the term, examples of the use of the term, as well as a visual representation of the term in an image. According to *MYP: Fostering interdisciplinary teaching and learning in the MYP,* transdisciplinarity can be defined as:

"Working across and beyond disciplines, eliminating boundaries.

---

[191] *DP: FPIP*, p. 57.
[192] *PYP: FPIP – Learning and Teaching*, p. 2.
[193] *PYP: FPIP – The Learning Community*, p. 67.
[194] *PYP: FPIP – Learning and Teaching*, p. 2.

Transcends the confines of disciplines to explore an issue using a shared approach for inquiry". [195]

The DP documentation provides some references and some definition-like passages around transdisciplinary learning without providing a clear definition of this term. Indeed, the DP and the CP FPIPs provide the same definitional description of transdisciplinarity related to the use of concepts in transdisciplinary teaching. More specifically:

"Teaching through concepts encourages teachers to promote a broad approach to education that can encompass many ways of thinking, inspire a variety of experiences, and open doors to exciting and highly relevant interdisciplinary and transdisciplinary learning." [196]

Furthermore, a definition of transdisciplinarity is also presented in the CP document *Personal and Professional Skills teacher support material* indicating that "transdisciplinarity is the ability to understand concepts across multiple disciplines". [197]

4.7.4 Definitions: Conclusion

This scoping of IB documentation on the definitions of "interdisciplinarity", "multidisciplinarity", and "transdisciplinarity" indicates that the definitions of these terms are only evident in IB programme documents but not in cross-programme documentation. Additionally, the scoping showed that in some programme-specific documents the IB provides official definitions of these terms either in the form of labelled definitions included in the documents' glossaries or separate paragraphs and sentences included in the documents. Also, it was evident that in some cases IB documents include many descriptive passages of the definitions which aim to provide in-depth information on the key elements of these terms.

While our analysis showed that the IB uses the same or similar wording and phrasing across programmes to describe the definitions of "interdisciplinarity", "multidisciplinarity", and "transdisciplinarity", the format in which the definitions are presented in the different programme documentation differs significantly. These different formats include official-looking definitions in glossaries, tables or bullet points, definition-like phrases, and paragraphs providing descriptions of the key elements of these terms. The lack of a consistent approach in the presentation and format of the definitions of "interdisciplinarity", "multidisciplinarity", and "transdisciplinarity" across the programme-specific documents is something that could be addressed in order to improve clarity for those IB staff who work across multiple programmes.

Additionally, our review of IB documentation indicated that while programme-specific documents often provide references to interdisciplinarity either in a form of a definition or definition-like passage, clearly flagged definitions of interdisciplinarity are not provided in the CP and DP documentation. Furthermore, our review showed that the CP documentation does

---

[195] *MYP: Fostering Interdisciplinary Teaching and Learning in the MYP*, p. 9.
[196] *CP: FPIP*, p. 73.
[197] *CP: Personal and Professional Skills TSM*.

not include any clear definition or definitional passage on multidisciplinarity. Moreover, our scoping indicated that the cross-programme document *What is an IB Education?* does not include any refence to the definitions of these terms. As this is a vital cross-programme document, it is an opportunity to provide a summary of the clear definitions of interdisciplinarity, multidisciplinarity, and transdisciplinarity in order to help IB staff who work across multiple programmes to understand the underpinning values of each one of the approaches to teaching and learning, their similarities and differences.

Extracted Highlights (4.7)

- IB definitions of "interdisciplinarity", "multidisciplinarity", and "transdisciplinarity" are only evident in programme-specific documents, not in cross-programme documentation. Inclusion of these definitions in cross-programme documentation could facilitate the consistent understanding of those terms by IB staff who work across multiple programmes.
- Some programme-specific documents provide official definitions of these terms either in the form of labelled definitions included in glossaries or definition-like phrases, passages, and sentences. In some cases, programme-specific documents include descriptive paragraphs which provide in depth discussion of these terms based on relevant academic literature.
- The IB uses the same or similar wording and phrasing across programme-specific documentation to describe the definitions of "interdisciplinarity", "multidisciplinarity", and "transdisciplinarity". However, the development of a consistent approach on the format and presentation of these definitions across cross-programme and programme-specific documents could improve clarity.

4.8 Curriculum Components

The IB has three key curriculum components which take the form of structured frameworks:
- The Learner Profile – which is comprised of 10 attributes towards which all students are expected to develop. All members of the learning community are expected to model these attributes.
- The Approaches to Teaching – which is comprised of six pedagogic principles that describe the overarching teaching philosophy of all IB programmes.
- The Approaches to Learning – which is comprised of five interrelated skill categories. This provides a skills framework towards which students are expected to develop over the course of their learning.

In this section, the individual elements of each of these curriculum components (the LP attributes, the ATT principles, and the ATL skills) will be explored for links to the concept of interdisciplinary learning. Using a colour-code method, these individual elements and their corresponding one-two sentence descriptors (found in IB documentation in resources such as *What is an IB Education?*) will be highlighted and annotated for both explicit and implicit links to interdisciplinary learning.

- <mark>Explicit Links</mark> are those which do not require significant lateral thinking or analysis for a reader to recognise that interdisciplinary learning is being described or referenced.
- <mark>Strong Implicit Links</mark> are those which do relate to interdisciplinary learning but require a moderate level of lateral thinking in order to discern the link.
- <mark>Weak Implicit Links</mark> are those which do relate to interdisciplinary learning but are only discernible with significant lateral thinking or close analysis of the implications of the words and phrases used.

When the curriculum component element and its descriptor have been highlighted and annotated with the relevant explicit and implicit links, a judgement will be given as to whether or not the curriculum component element qualifies overall as an <mark>explicit link</mark> to interdisciplinary learning, a <mark>strong implicit link</mark>, a <mark>weak implicit link</mark>, or no link. The reasoning for these judgements will be explained in each case, with reference to the annotation.

4.8.1 Learner Profile

Table 4: IB Learner Profile Links to Interdisciplinary Learning

LP Attribute	IB Descriptor	Connection to Interdisciplinary Learning	Judgement
Inquirers	We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life.	Strong Implicit Links: 1) "Developing skills for inquiry and research" implies that students may be gathering, interpreting, and synthesising information from numerous disciplines. Weak Implicit Links: 2) "Learn[ing] independently and with others" is an important skill for the development of interdisciplinary learning. However, it is also possible for this to take place outside of the realm of interdisciplinary learning.	Strong Implicit Link References to developing skills for inquiry and research and knowing how to learn independently and with others are important skills for interdisciplinary learning. However, it is possible for these to take place outside of interdisciplinarity, making the overall link to interdisciplinary learning only implicit.
Knowledgeable	We develop and use conceptual understanding, exploring knowledge across a range of disciplines. We engage with issues and ideas that have local and global significance.	Explicit Links: 1) "Conceptual Understanding" is inherently interdisciplinary because it does not stop at the borders of a discipline. 2) "Across a range of disciplines" directly describes interdisciplinarity. Weak Implicit Links: 1) "Ideas that have local and global significance" are highly likely to be relevant to more than one discipline, and to push	Explicit Link The use of phrases "conceptual understanding" and "across a range of disciplines" are both key signposts of interdisciplinarity, and this is supplemented by further implicit links. Overall, this is amongst the most explicit possible

LP Attribute	IB Descriptor	Connection to Interdisciplinary Learning	Judgement
		students to use multiple disciplines in their thinking.	links to interdisciplinary learning.
Thinkers	We use critical and creative thinking skills to analyse and take responsible action on complex problems. We exercise initiative in making reasoned, ethical decisions.	Strong Implicit Links: 1) Using "critical and creative thinking skills to analyse and take responsible action on complex problems" is potentially interdisciplinary. The key phrase here is "complex problems" which may relate to applying knowledge and skills from different disciplines. Weak Implicit Links: 2) "making reasonable and ethical decisions" suggests considering a problem from various viewpoints and bringing together knowledge from more than one discipline. But it is also possible to make a reasonable and ethical decision without involving interdisciplinarity.	Strong Implicit Link References to "creative and critical thinking skills" are potential signposts to interdisciplinary learning. Moreover, the phrase "complex problems" may invoke real-world issues that naturally cross disciplines. Overall, though, the link remains only implicit.
Communicators	We express ourselves confidently and creatively in more than one language and in many ways. We collaborate effectively, listening carefully to the perspectives of other individuals and groups.	Weak Implicit Links: 1) "Creatively" expressing ourselves may involve the creative movement between individual disciplines. But it is also possible to be creative without being interdisciplinary. 2) "More than one language" could be interpreted as being across multiple disciplines. But the use of multiple languages is not necessarily interdisciplinary, as they may be used distinctly from one another. 3) The ability to "collaborate" is one of the most important skills for development of interdisciplinary learning. But it is also possible for collaboration to take place outside of interdisciplinary learning. 4) "Listening carefully to the perspectives of other individual and groups" is an accurate description of how collaboration might be used to enable interdisciplinarity. However, it is also possible for this to take place outside of the realm of interdisciplinary learning.	Strong Implicit Link The references to collaboration and "listening effectively to the perspectives" of others are both important skills for interdisciplinary learning, but neither of them is explicitly interdisciplinary. It is possible for collaboration and effective listening to take place outside of interdisciplinarity. Overall, this is an implicit link but a strong one due to the cumulative effect of having a large number of weak implicit links within the descriptor.

LP Attribute	IB Descriptor	Connection to Interdisciplinary Learning	Judgement
Principled	We act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and rights of people everywhere. We take responsibility for our actions and their consequences.	Weak Implicit Links: 1) Having "respect for the dignity and rights of people everywhere" is highly likely to be relevant to more than one discipline, and encourage students to use multiple disciplines in their thinking, but this is not certain.	Weak Implicit Link References to "respect for the dignity and rights of people everywhere" points to thinking across boundaries and therefore potentially interdisciplinarity, but this is not by any means explicit.
Open-Minded	We critically appreciate our own cultures and personal histories, as well as the values and traditions of others. We seek and evaluate a range of points of view, and we are willing to grow from the experience.	Strong Implicit Links: 1) The ability to "critically appreciate our own cultures and personal histories, as well as the values and traditions of others" is likely but not certain to point to interdisciplinary learning, due to the different disciplines inherent in the content of histories and cultures. Weak Implicit Links: 2) To "seek and evaluate a range of points of view" is likely to be relevant to more than one discipline, and to encourage students to use multiple disciplines and think beyond their own life experiences, but it is also possible to have a range of points of view within a single discipline.	Strong Implicit Link References to critically appreciating our own cultures and the values and traditions of others, and the ability to "seek and evaluate a range of points of view" suggests connecting and integrating several schools of thought. This, combined with the attribute "open-minded", means this implicit but a strong reference to interdisciplinarity. More explicitly interdisciplinary terms would need to be included in the descriptor for it to qualify as explicit.
Caring	We show empathy, compassion and respect. We have a commitment to service, and we act to make a positive difference in the lives of others and in the world around us.	Weak Implicit Links: 1) Developing the values of "empathy, compassion and respect" is likely to involve thinking beyond one discipline. 2) "in the world around us" implies thinking beyond our own experience.	Weak Implicit Link References to "empathy, compassion and respect" and making a positive difference "in the lives of others and in the world around us" *suggests* considering and synthesising information from different disciplines, but this is not explicit.

LP Attribute	IB Descriptor	Connection to Interdisciplinary Learning	Judgement
Risk-Takers	We approach uncertainty with forethought and determination; we work independently and cooperatively to explore new ideas and innovative strategies. We are resourceful and resilient in the face of challenges and change.	Weak Implicit Links: 1) "we approach uncertainty" is likely to mean stepping outside of a single discipline and being comfortable with the uncertainty this brings. 2) Working "independently and cooperatively to explore new ideas and innovative strategies" is an important skill for development of interdisciplinary learning. But it is also possible for collaboration to take place outside of interdisciplinary learning.	Weak Implicit Link References to approaching uncertainty and working "independently and cooperatively to explore new ideas and innovative strategies" is an important skill for development of interdisciplinary learning. However, it is also possible for collaboration to take place outside of interdisciplinary learning and therefore the link here is not explicit.
Balanced	We understand the importance of balancing different aspects of our lives—intellectual, physical, and emotional—to achieve well-being for ourselves and others. We recognize our interdependence with other people and with the world in which we live.	Strong Implicit Link: 1) "Balancing different aspects of our lives – intellectual, physical and emotional" is inherently interdisciplinary because it does not stop at the borders of a discipline. 2) Recognising "interdependence with other people and with the world in which we live" is highly likely to indicate interdisciplinary learning.	Strong Implicit Link The use of words including "balancing" different aspects of our lives and recognising "interdependence" suggests the learner is moving beyond understanding from a single disciplinary perspective and therefore combines to be an explicit link to interdisciplinary learning.
Reflective	We thoughtfully consider the world and our own ideas and experience. We work to understand our strengths and weaknesses in order to support our learning and personal development.	Weak Implicit Links: 1) "thoughtfully consider[ing] the world and our own ideas and experience" may involve different disciplines. However, it is also possible for this to take place outside of the realm of interdisciplinary learning.	Weak Implicit Link The first sentence of the descriptor "we thoughtfully consider the world and our own ideas and experience" along with the title "Reflective" points to interdisciplinary learning, although the link is not explicit.

Overall, this analysis of the Learner Profile attributes demonstrates a combination of explicit, strong implicit, and weak implicit links to interdisciplinary learning. One notable conclusion from this table is that there is no single LP attribute which does not have at least a weakly implicit connection to interdisciplinary learning. As a result, it would be fair to conclude that interdisciplinary learning is embedded to a significant degree within this curriculum component. The strongest link comes through the attribute "Knowledgeable".

4.8.2 Approaches to Teaching

Table 5: IB Approaches to Teaching Links to Interdisciplinary Learning

ATT Principle	IB Descriptor	Connection to Interdisciplinary Learning	Judgement
Based on inquiry	A strong emphasis is placed on students finding their own information and constructing their own understandings.	Weak Implicit Links: 1) The process of "students finding their own information and constructing their own understandings" is likely to push them towards numerous disciplines, but it is also possible to construct an understanding from one disciplinary source.	Weak Implicit Link References to "students finding their own information and constructing their own understanding" is an implicit link to interdisciplinary learning as it seems to suggest numerous sources, but this is not necessarily the case or explicit here.
Focused on conceptual understanding	Concepts are explored in order to both deepen disciplinary understanding and to help students make connections and transfer learning to new contexts.	Explicit Links: 1) Making "connections" between concepts and transferring "learning to new contexts" is inherently interdisciplinary.	Explicit Link References to making "connections and transfer[ing] learning to new contexts" is an explicit link to interdisciplinary learning as it makes clear that students will cross the boundaries of single disciplines.
Developed in local and global contexts	Teaching uses real-life contexts and examples, and students are encouraged to process new information by connecting it to their own experiences and to the world around them	Strong Implicit Links: 1) Processing "new information by connecting it to their own experiences and to the world around them" encourages students to make connections between different disciplines and their own lives. Weak Implicit Links: 1) The use of "real-life contexts and examples" is highly likely to enable effective interdisciplinary learning but it is also possible for these examples to remain within one discipline.	Strong Implicit Link Reference to processing "new information by connecting it to their own experiences and the world around them" is a strong implicit link to interdisciplinarity as it is highly likely (though not certain) to involve collating and synthesising information across disciplines.

ATT Principle	IB Descriptor	Connection to Interdisciplinary Learning	Judgement
Focused on effective teamwork and collaboration	This includes promoting teamwork and collaboration between students, but also refers to the collaborative relationship between teachers and students.	Weak Implicit Links: 1) The ability to "collaborate" is one of the most important skills for development of interdisciplinary learning. But it is also possible for collaboration to take place outside of interdisciplinary learning.	Weak Implicit Link "Teamwork and collaboration" are likely to enable effective interdisciplinary learning but the link here is not explicit as this could take place within one single discipline.
Designed to remove barriers to learning	Teaching is inclusive and values diversity. It affirms students' identities, and aims to create learning opportunities that enable every student to develop and pursue appropriate personal goals	Weak Implicit Links: 1) Valuing "diversity" suggests that a range of viewpoints and experiences will be considered which will span numerous disciplines.	Weak Implicit Link There is an implicit link to interdisciplinary learning here with reference to valuing "diversity", as it suggests considering a range of viewpoints and experiences.
Informed by assessment	Assessment plays a crucial role in supporting, as well as measuring, learning. This approach also recognizes the crucial role of providing students with effective feedback.		No link It is possible for assessment to be interdisciplinary but there is no evidence of this here in isolation.

Overall, this table demonstrates that the Approaches to Teaching principles contain a combination of explicit, strongly implicit, weakly implicit, and no links to interdisciplinary learning. The only principle which contains no link to interdisciplinary learning is "Informed by Assessment", whereas the strongest link comes through "Focused on Conceptual Understanding".

4.8.3 Approaches to Learning

Table 6: IB Approaches to Learning Links to Interdisciplinary Learning

ATL Skill	IB Descriptor	Connection to Interdisciplinary Learning	Judgement
Thinking Skills	Including areas such as critical thinking, creative thinking and ethical thinking	Weak Implicit Links: 1) Thinking critically, creatively and ethically implies the movement between individual disciplines. But it is also possible to be critical, creative and ethical without being interdisciplinary.	Weak Implicit Link References to critical, creative and ethical thinking does link to interdisciplinarity – creativity often requires interdisciplinary knowledge – but the link here is not explicit.
Research Skills	Including skills such as comparing, contrasting, validating and prioritizing information.	Strong Implicit Link: 1) "comparing and contrasting" and "prioritizing" is inherently interdisciplinary in the context of knowing how to effectively carry out research.	Strong Implicit Link "comparing and contrasting" and "prioritizing" are strong implicit links to interdisciplinary learning as it suggests using methods and insights of several established disciplines or fields of study. This judgement was also informed by the attribute name "Research Skills", which is likely to require interdisciplinarity.
Communication Skills	Including skills such as written and oral communication, effective listening, and formulating arguments.	Weak Implicit Links: 1) "Formulating arguments" is likely to involve synthesising information from different sources/disciplines, but not necessarily.	Weak Implicit Link References to "formulating arguments" does suggest connecting and integrating several schools of thought but the link here is not explicit.
Social Skills	Including areas such as forming and maintaining positive relationships, listening skills, and conflict resolution.	Weak Implicit Links: 1) "positive relationships, listening skills, and conflict resolution" are likely to involve integrating different viewpoints/sources/schools of thought but this is not necessarily always the case.	Weak Implicit Link References to forming and maintaining "positive relationships, listening skills, and conflict resolution" are likely to involve integrating different viewpoints, those from different backgrounds, looking beyond our own experiences and views of the world but the link is not explicit.

Self-management skills	Including both ==organisational skills==, such as managing time and tasks, and affective skills, such as managing state of mind and motivation	Implicit Links: 1) Having "organizational skills" would enable balancing work across different content areas and is therefore an implicit link to interdisciplinarity.	<u>Weak Implicit link</u> Reference to "organizational skills" is an implicit link as it is likely that interdisciplinary learning would not be possible without organisational skills. Also, the ability to self-manage would enable effective interdisciplinary learning.

Overall, this analysis of the Approaches to Learning skills demonstrates a combination of strong implicit and weak implicit links to interdisciplinary learning. One notable conclusion from this table is that there is no single ATL skill which does not have at least an implicit connection to interdisciplinary learning. The strongest link to interdisciplinary learning comes through "Research Skills".

Extracted Highlights (4.8)

- Ecctis analysis showed that there is no single LP attribute which does not have at least a weakly implicit connection to interdisciplinary learning. This indicates that interdisciplinary learning is embedded to a significant degree within the LP. The LP attribute **"Knowledgeable"** was found to have the strongest link to interdisciplinarity, using phrases such as "conceptual understanding" and "across a range of disciplines".
- The ATT has examples of principles with explicit, strongly implicit, weakly implicit, and no link to interdisciplinary learning. The only principle which contains no link to interdisciplinary learning is **"Informed by Assessment"**. The strongest link was found in the **"Focused on Conceptual Understanding"**, using phrases such as "connections and transfer[ing] learning to new contexts".
- ATL skills demonstrate a combination of strong implicit and weak implicit links to interdisciplinary learning. Ecctis analysis showed that there is no single ATL skill which does not have at least an implicit connection to interdisciplinary learning. The strongest link to interdisciplinary learning was found in **"Research Skills"**, which include phrases such as "comparing and contrasting" and "prioritizing".

5. Developing a Benchmarking Tool

5.1 Introduction

The literature review uncovered 18 Elements of Promising Practice (EoPPs) which describe, in general terms, what practices and structures in K-12 education programmes may lead to effective embedding of interdisciplinary learning into the curriculum. These EoPPs include topics such as providing effective definitions, enabling curriculum flexibility, guaranteeing continuing professional development with an interdisciplinary focus, and more.

The benchmarking tool uses the 18 EoPPs to assess current IB practices against the promising practice identified in the literature review. The intention of the benchmarking tool is to answer research question 3:

> Research Question 3: How does IB programmes' interdisciplinarity approach compare with extant research and global promising practices?

In order to effectively answer this question, each IB programme (PYP, MYP, DP, and CP) will be compared against every EoPP. With 18 EoPPs and four IB programmes, this results in 72 individual judgements of how effectively the IB programmes are currently embedding the identified promising practice.

5.2 Selecting IB Documents and Resources

In order to assess each IB programme against the 18 EoPPs, it was necessary to select a range of IB documents and resources to use in this benchmarking to represent current IB practice. The resource selection was made jointly between Ecctis researchers and IBO staff. The aim of the resource selection was to:

- Include top-level documentation with key information about the IB as a whole and about individual programmes;
- Include a variety of documentation covering different document types and describing different parts of the curricula of all programmes;
- Embrace a broad range of subjects, including some that are likely to be highly interdisciplinary in nature as well as others which might traditionally be viewed as solidly disciplinary. Where possible, subjects were also chosen which were quite dissimilar (i.e. not all selected subjects were sciences, not all arts, not all humanities etc.).

The final document selection agreed between Ecctis researchers and IB staff is as follows:

Table 7: IB Resources used in Benchmarking Tool

Cross-Programme Documents	FPIPs	"Core" Guides	Subject Guides	Teacher Support Materials
What is an IB Education?	PYP: FPIP – Overview	MYP: Projects Guide	MYP: Individuals and Societies Guide	MYP: Individuals and Societies TSM
	PYP: FPIP – The Learner	DP: TOK Guide	MYP: Fostering Interdisciplinary Teaching and Learning in the MYP	MYP: Fostering Interdisciplinary Teaching and Learning in the MYP TSM
	PYP: FPIP – The Learning Community	DP: CAS Guide		
		DP: Extended Essay Guide	MYP: Language and Literature Guide	MYP: Language and Literature TSM
	PYP: FPIP – Learning and Teaching	CP: Personal & Professional Skills Guide	MYP: Mathematics Guide	MYP: Mathematics TSM
	MYP: FPIP	CP: Reflective Project Guide		
	DP: FPIP		DP: Environmental Systems and Societies Guide	DP: Language B TSM
	CP: FPIP			DP: Environmental Systems and Societies TSM
			DP: Theatre Guide	
			DP: Mathematics Applications and Interpretation Guide	DP: Mathematics Applications and Interpretation TSM
			DP: Literature and Performance Guide	DP: Geography TSM
			DP: Language B Guide	
			DP: Geography Guide	

The benchmarking is based almost entirely on this documentation, with wider reference only to the detailed breakdown of the curriculum components (LP, ATT, ATL) discussed at length in section 4. Those curriculum components are found within the documentation included in the benchmarking, therefore, the inclusion of the breakdown of those components as cross-programme context still falls within the documentation limits of the benchmarking exercise.

Because the benchmarking is based only on these resources, the embeddedness judgements for each programme are based on the documentation selected here which applies to each of those programmes. It is possible that IB resources or documentation not included in this

benchmarking contain evidence that would alter the embeddedness judgements made here, but the scope of this research project necessitated a document selection of the current size and reach. All efforts have been made to ensure that key resources that would likely have an impact on embeddedness judgements have been included in the benchmarking, whilst also selecting documents which give a fair and indicative presentation of the range of IB resources.

5.2.1 Newer Resources

Following initial completion of the benchmarking with the above-listed resources, the IB notified Ecctis that some documents were soon to be updated with edited or rewritten versions. It was agreed between the IB and Ecctis that rather than beginning the benchmarking again with a new selection of documents, an appendix to this report (Appendix 1) would be used to compare the new resources with their older equivalents, and analyse the impact that these new resources would be likely to have on the existing benchmarking judgements. Appendix 1 is therefore intended not only to analyse the new documents but also provide added value by enabling a comparison between older resources and newer resources, reflecting on the direction of travel (in relation to embeddedness of interdisciplinary learning) when resources are updated. This information is taken into account in Section 7 (Conclusions and Considerations), where the discussion considers the changes and developments already initiated by these updates.

5.3 Judging Level of Integration by Programme

The application of this benchmarking tool consists of making judgements about the extent to which each IB programme (as represented by the selected documentation) demonstrates evidence of embedding each of the EoPPs.

In order to enable an effective summary of these judgements, and to provide a structured output of this benchmarking exercise, each embeddedness judgement can result in one of four judgements:

- ■ = High embeddedness of element
- ■ = Moderate embeddedness of element
- ■ = Low embeddedness of element
- □ = No embeddedness of element

These judgement options have been colour coded on a scale from dark red to white, to represent the embeddedness judgements at a glance.

Because each EoPP is a unique entity (representing the findings of the literature review in a simple form) there is not a one-size-fits-all approach to making judgements of High, Moderate, Low, or No embeddedness. Different forms of evidence may be used to satisfy different EoPPs, so each embeddedness judgement is a unique piece of qualitative analysis which draws on evidence from the selected sources in order to develop a fully-justified explanation for why one embeddedness level was chosen instead of others. For example, EoPP 1 – to deliver a coherent, research-informed definition of interdisciplinary learning, which is guided by the intended purpose of deploying interdisciplinarity – could potentially give a high

embeddedness judgement for a programme if a single highly-effective definition was found in a clear and well-placed position within the resources. On the other hand, EoPP 15 – to embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual nature of specific disciplines – would require evidence in multiple places within documentation in order to give a high embeddedness judgement for a programme. For EoPP 1 the nature of effective evidence could be a well-placed definition; for EoPP 15 effective evidence might include the structure of subjects, the nature of assessment, tools within teacher support materials, and more. Because of this variety within the EoPPs, each judgement has been accompanied by a full description of what evidence was used to develop the decision, quoting directly from resources where appropriate.

Each programme judgement for each EoPP is arrived at through close consideration of the available evidence from the selected resources which are relevant to that programme. In some cases, there is also relevant cross-programme context which may stem from *What is an IB Education?* or from the detailed breakdown of the IB curriculum components (LP, ATT, ATL). Where cross-programme context is relevant to the judgement for a particular EoPP, this is detailed in the application of the benchmarking tool using the subheading "Cross-Programme Context".

It is important to state that although there are relatively few of the selected resources which are specific to the CP only (*CP: FPIP*, *CP: Personal and Professional Skills Guide*, and *CP: Reflective Project Guide*), the DP subject-based documentation is jointly relevant to the CP and DP. Although guides such as *DP: Geography* are named after the Diploma Programme, they are in fact joint DP/CP resources. The same can be said for TSMs which stem directly from joint DP/CP subjects. Embeddedness judgements are presented for each EoPP in the order: PYP; MYP; DP; CP. Therefore, as a result of the overlap in documentation between the DP and CP, embeddedness judgements for the CP will sometimes refer to evidence which has already been presented in the embeddedness judgement write-up for the DP.

Finally, it should be noted that the application of the Benchmarking Tool has been designed to capture current IB practice in relation to the EoPPs as effectively as possible, but (like any approach) it has specific limitations. These limitations are presented in the table below, along with any mitigation strategies employed. Mitigation strategies do not entirely prevent the influence of limitations, but they maximise the report's ability to address the research questions with evidence-based conclusions.

Table 8: Audit Methodology Limitations and Mitigation Strategies

Limitations	Mitigation Strategies
Only a specific list of documentation has been included (see Section 5.2 for full list). So, it is possible that relevant information in other resources will not contribute to EoPP embeddedness judgements.	The IB Resources Overview was deployed prior to the Application of the Benchmarking Tool in order to take a wider look at the nature of IB resources in general and ascertain any likely "blind spots" for the Benchmarking Tool. The question of non-audited evidence is also discussed in section 5.5, below, and in Section 7.

	The list of documents and resources examined with the Benchmarking Tool was designed in conversation with IB research staff.
Classifying all judgements as either High, Moderate, Low, or None has the potential to oversimplify complex judgements.	Full write-ups are provided of how judgements were made and what evidence was used for every EoPP in every programme. This is intended to provide nuance. The conclusions in Section 7 provide further discussion of the context which should be considered when interpreting EoPP judgements.
Due to the large number of EoPPs (18), coding the documents for evidence of each being embedded was done at a single level of "potential links" to the EoPP. This gathers all evidence under one rubric and does not differentiate between implicit and explicit links.	The additional differentiation between explicit and implicit links to an EoPP was often developed in the write-up of EoPP judgements, where the whole nature of the EoPP and the type of evidence being examined could be discussed at length. Stakeholders still have access to coded differentiations between implicit and explicit links to interdisciplinary learning in the IB Resources Overview's analysis of the LP, ATT, and ATL (Section 4.8).

5.4 Evidence Mining Method

A composite exhaustive-reading and selective close-reading approach was taken to extracting relevant evidence from IB resources which would inform the 72 embeddedness judgements. As part of the auditing process, and in preparation for the application of this benchmarking tool, Ecctis analysts examined every subsection of the resources identified for use in this benchmarking. From this exhaustive reading, a broad understanding was constructed of how interdisciplinarity was articulated across the selected resources. For an example of how resources were scoped for relevant content see Appendix 2, where the scoping of four different resources is demonstrated.

In developing the embeddedness judgements, Ecctis analysts supplemented this broad understanding of the resources with selective close reading of sections and subsections which were identified as being highly relevant to the EoPP in question. These relevant sections and subsections were identifiable through a number of possible qualities: what the exhaustive reading had found them to address; what the titles of sections/subsections describe them as containing; what keywords or phrases were contained in them; where they are placed within documentation; and other features besides. Because this benchmarking was driven by and structured by the EoPPs, and because these are so diverse in nature, the audit methodology employed by Ecctis analysts needed to be highly flexible.

Two examples will be given of how evidence was linked to EoPPs, to give an indication of how a variety of approaches were taken in order to adequately respond to the criteria of each EoPP.

EoPP 1 – To deliver a coherent, research-informed definition of interdisciplinary learning, which is guided by the intended purpose of deploying interdisciplinarity.

This promising practice requires effective definitions, and states in its additional details that "the definition should ideally be found in an easy-to-locate resource (such as a glossary) but should also be coherent when referenced or developed in other locations within documentation". As a result, finding evidence of effective embedding of this EoPP could be driven first by an examination of any glossaries within the resources (previously identified by the exhaustive reading). These glossaries – in places such as the end of *PYP: FPIP – The Learning Community* or *DP: Language B Guide* – were subjected to close reading to extract any relevant definitions for terms such as "interdisciplinarity" or "transdisciplinary". Following this analysis of glossaries, a word-search was carried-out across all resources to unearth all uses of potentially relevant words, and to note if clear definitions or definition-like phrases were used in any cases. For each programme, the sum of this evidence was assessed, and embeddedness judgements were made based on the existence of definitions, the detail within them (in relation to intended purposes and research-basis), and their coherence across a programme.

EoPP 13 – To link interdisciplinary assessment with conceptual understanding, disciplinary grounding, advancement through integration and critical awareness.

This promising practice is specifically linked to assessment practices and lists a number of features which show promising potential to make interdisciplinary assessment as effective as possible. This EoPP does not ask that all assessment is interdisciplinary (this is an issue tackled more directly by EoPP 12), it merely recommends a number of features for where interdisciplinary assessment is deployed. As such, evidence in this case originated with close reading of sections of resources which directly described assessment practices (such as assessment objectives and methods). These sections were easily identifiable in subject guides, TSMs, and core guides. The evidence related to assessment in specific parts of the curriculum was also supplemented by evidence of top-level assessment policies as established in relevant sections of programme FPIPs. Finally, when evidence directly related to assessment had been gathered, the individual components of EoPP 13 were also used to check resources for any additional relevant evidence. For example, if more evidence were needed that conceptual understanding was taken into account in the design of interdisciplinary assessment, specific sections of documentation which described use of conceptual understanding in IB programmes (for example, at the end of *DP: FPIP* and *CP: FPIP*) would be checked to ensure that there was nothing here relevant to interdisciplinary assessment practices in the IB.

As is evident from these two examples, a flexible audit methodology was needed in order to respond to the diverse evidence requirements of the EoPPs. Although there was a high degree of flexibility, a combination of exhaustive initial scoping followed by selective close reading (guided by subsection content or use of key terms and phrases) was used in all cases.

5.5 IB Resources Not Included in the Benchmarking

The EoPP judgements are made purely from the evidence contained in the resources selected for this benchmarking exercise (See section 5.2). However, there may also be some other IB resources which contain evidence that would have informed these EoPP judgements, if they had been included in the benchmarking. Although Ecctis will not take these additional resources into account in the development of EoPP judgements, section 7 of this report (Conclusions and Considerations) will discuss the existence of these other resources where relevant. Such resources may include newly updated documents (see Appendix 1) or materials such as CPD workshop documents, which were simply not within the scope of the audit. Because such resources were not selected for the benchmarking, they will not influence the EoPP judgements, but they will provide context for discussion around the considerations and conclusions.

6. Applying the Benchmarking Tool to IB Programmes

6.1 Summary of Benchmarking Tool

Table 9: Summary of Benchmarking Tool Embeddedness Judgements

Elements of Promising Practice (Benchmarking Tool) Key: ■ = High embeddedness of element ■ = Moderate embeddedness of element ■ = Low embeddedness of element □ = No embeddedness of element	PYP	MYP	DP	CP
EoPP 1: To deliver a coherent, research-informed **definition** of interdisciplinary learning, which is guided by the intended **purpose** of deploying interdisciplinarity.	High	High	Low	Low
EoPP 2: To engage clearly and coherently with the differences and similarities between **interdisciplinarity** and other related terms such as **multidisciplinarity** and **transdisciplinarity**.	High	High	Low	No
EoPP 3: To ensure a significant level of teacher **scaffolding** to help students deploy disciplines and interdisciplinarity effectively.	High	High	High	High
EoPP 4: To explicitly link interdisciplinary learning with other features of **constructivist pedagogy**, including concept-based teaching, student-led inquiry, collaboration, and authentic learning.	High	High	High	High
EoPP 5: To clearly articulate and communicate, to staff and students, the **value** and **benefits** of interdisciplinary learning.	High	High	Moderate	Moderate
EoPP 6: To promote the use of authentic **problem-solving** and interdisciplinary **project-based** learning as two key tools for developing interdisciplinarity in the classroom.	High	High	High	High
EoPP 7: To create sufficient **flexibility** in the curriculum for teachers to authentically link learning to student interests and new research developments, and to reflectively develop best practice approaches.	Moderate	High	High	High
EoPP 8: To encourage the use of a wide variety of **multimodal** sources, enabling students to build their own links between disciplines and explore knowledge areas.	High	Moderate	Moderate	Moderate
EoPP 9: To show **proactive engagement** with the key **challenges** which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning.	High	Moderate	Moderate	Low
EoPP 10: To develop interdisciplinarity within an **age-appropriate** structure, with scope for **development** along the K-12 age continuum.	High	High	High	High
EoPP 11: To explain the link between interdisciplinarity and key **skills and competences** including communication, critical thinking, synthesis, and metacognitive awareness of perspectives.	High	High	High	High
EoPP 12: To take interdisciplinary learning into account in the **design of assessment**.	High	High	Moderate	Low
EoPP 13: To **link interdisciplinary assessment** with conceptual understanding, disciplinary grounding, advancement through integration, and critical awareness.	Low	High	High	Moderate
EoPP 14: To encourage **interdisciplinarity** and individual **disciplines** to **mutually reinforce** one-another; with interdisciplinary methods being used to develop deep and innovative disciplinary understanding.	Moderate	High	High	High
EoPP 15: To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual **nature of specific disciplines**.	Low	High	High	Moderate
EoPP 16: To provide **continuing professional development** opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies.	Moderate	Low	Moderate	Low
EoPP 17: To encourage and enable collaborative practices within schools which encompass **teacher-teacher collaboration** within an effective format but also involve a **school-wide effort**.	High	High	High	High
EoPP 18: To **put time aside** in the curriculum which is explicitly for teachers to **reflect and collaborate** around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity.	Low	Moderate	Moderate	Moderate

6.2 EoPP Judgements

6.2.1 EoPP 1: To deliver a coherent, research-informed definition of interdisciplinary learning, which is guided by the intended purpose of deploying interdisciplinarity

– A definition of interdisciplinarity or interdisciplinary learning should be clearly expressed, coherent across all documentation that may be encountered by stakeholders, and should be based on research into interdisciplinary learning which has taken place in recent decades. There are many different possible aims and purposes behind the deployment of interdisciplinary learning, so the definition should reflect an active engagement with the chosen and intended purpose. The definition should ideally be found in an easy-to-locate resource (such as a glossary) but should also be coherent when referenced or developed in other locations within documentation.

	EoPP 1: To deliver a coherent, research-informed definition of interdisciplinary learning, which is guided by the intended purpose of deploying interdisciplinarity			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	Low	Low

Cross-Programme Context:
- See section 4.8 (above) on consistency of definitions between IB programmes.
- *What is an IB Education?* does not contain any explicit definitions but does make links between the IB's philosophy of international mindedness and the ability to move between disciplines. "By engaging with diverse beliefs, values and experiences, and by learning to think and collaborate across cultures and disciplines, IB learners gain the understanding necessary to make progress towards a more peaceful world". [198]

PYP Embeddedness Judgement:
As well as the cross-programme context described above, there are two key places within the PYP documentation examined in this audit where definitions related to interdisciplinarity are deployed. Firstly, though, it is important to state that the PYP explicitly pursues a transdisciplinary curriculum, not an interdisciplinary one. This fact, however, does not alter the fact that the EoPPs identified in the literature review should still apply to implementation of the PYP. The promising practice of interdisciplinarity and transdisciplinarity are structurally similar, especially in light of promising practice such as EoPP 1 (i.e. coherent, research-informed definitions, guided by stated purpose of the approach). The two key places in the examined PYP documentation which carry out definitional work in this manner are the "Transdisciplinary Learning" section of *PYP: FPIP – Learning and Teaching* and the glossary of terms found at the end of *PYP: FPIP – The Learning Community*.

In the glossary at the end of *The Learning Community*, a definition is offered for "transdisciplinary" but not for "interdisciplinary" or any other directly related terms. In this

---

[198] *What is an IB Education?,* p. 2.

section, "transdisciplinary" is given the definition: "Transdisciplinary is an approach to learning and teaching that is integrated— going across, between and beyond subjects."[199]

In *Learning and Teaching*, definitions are offered for multiple relevant terms, but "transdisciplinarity" is specifically given the following lengthy description:

> "Transdisciplinarity 'concerns that which is at once between the disciplines, across the different disciplines, and beyond all disciplines' (Nicolescu 2014: 187). Nicolescu notes that a key imperative of transdisciplinary learning is to unite knowledge for the understanding of the present world. In transdisciplinarity, the disciplines are no longer distinguishable, like the ingredients in a cake, and the result is something completely different (Choi and Pak 2006).
>
> Transdisciplinarity transcends subjects. It begins and ends with a problem, an issue or a theme. Students' interests and questions form the heart of transdisciplinary learning. It is a curriculum-organizing approach where human commonalities rise to the top without regard for subject boundaries. Subjects become an instrument/tool/resource to explore a theme, problem or concept in depth. The result is a different or new organizing framework (Beane 1997; Klein 2006)."[200]

Although the latter definition is significantly longer than that produced in the glossary, this is very much an expansion of the same themes and ideas, rather than a different or clashing perspective. Specifically, the phrasing of Nicolescu's definition is clearly key to both. As such, in relation to the issue of coherence of definitions, as proposed by EoPP 1, the PYP documents examined are clearly doing this effectively.

It is also evident, particularly from the lengthy section of *Learning and Teaching* which addresses transdisciplinary learning, that the definitions in question are based on relevant and strong research.[201] That section, and other parts of *PYP: FPIP* contain both in-text references to relevant research and extensive bibliographies with strong research content.

Finally, the same section of *Learning and Teaching*, as well as scattered references throughout the other documents of the *PYP: FPIP* make clear and repeated references to the intended purposes of transdisciplinarity in the PYP – including fostering the ability to understand issues from multiple perspectives and addressing questions thematically rather than within the confines of a subject. This purpose is clearly reflected in the extended definition offered in *Learning and Teaching*. As such, the PYP documents examined here also show that the definitions of transdisciplinarity are structured around its intended purpose in the curriculum. Taking all of this into account, it is evident that there is High embeddedness of EoPP 1 in the PYP.

---

[199] *PYP: FPIP – The Learning Community*, p. 67.
[200] *PYP: FPIP – Learning and Teaching*, p. 2.
[201] *PYP: FPIP – Learning and Teaching*, pp. 2-25.

MYP Embeddedness Judgement:

MYP: FPIP contains an extensive glossary with definitions related to a number of terms relevant to how interdisciplinarity is embedded in the programme:

> "Integrated learning: An interdisciplinary approach to curriculum planning in which two or more disciplines within an MYP subject group are integrated into a single course. The IB provides external assessment services for MYP courses in integrated humanities and integrated sciences. Schools can also organize integrated approaches to teaching and learning in design and arts that can be externally moderated by the IB.
>
> Interdisciplinary: Combining or involving two or more branches of learning or fields of academic study. In the MYP, interdisciplinary study can be developed both within and between/among subject groups.
>
> Interdisciplinary assessment: Combining or involving two or more branches of learning or fields of academic study within a single assessment. In the MYP, interdisciplinary study can be developed both within and between/among subject groups. MYP external interdisciplinary assessment always involves multiple subject groups".[202]

These definitions already go a long way towards satisfying High embeddedness for EoPP 1, as they are clearly coherent with one another (making effective use of repeated phrases), and they are simple definitions found in an easily-located place within a key document.

The only viable criticism of these definitions is that they are very brief in their description of what "interdisciplinary" actually means. However, the issue of further detail is revolved earlier in the same document in a section named "Planning for Interdisciplinary Learning". This part of the *MYP: FPIP* explicitly describes interdisciplinary learning in more detail, and helpfully addresses the relationship between that definition and the intended purpose of interdisciplinary learning (as recommended by EoPP 1).[203]

Above and beyond the content of the FPIP, MYP documentation also offers even further detail on the meaning of interdisciplinary learning in *MYP: Fostering Interdisciplinary Teaching and Learning*. That document, as well as the first page of its corresponding TSM, provide as much detail as stakeholders could need on the definition of interdisciplinarity and how this aligns with its manifestation in the MYP curriculum.[204] As a result of such extensive coverage, and the fact that all subject guides examined also have a devoted page addressing the meaning of interdisciplinary learning, it is evident that the embeddedness judgement for EoPP 1 in the MYP is High.[205]

DP Embeddedness Judgement:

Compared to the PYP and MYP, the DP displays relatively little clarity on specific definitions of interdisciplinarity or interdisciplinary learning. Although these terms do appear in a number

---

[202] *MYP: FPIP*, p. 127.
[203] *MYP: FPIP*, p. 46.
[204] *MYP: Fostering Interdisciplinary Teaching and Learning*.
[205] In all MYP subject guides examined in this benchmarking, page 12 provided an effective and coherent definition of interdisciplinary learning.

of places throughout the DP documents analysed here, there is not a central location such as a glossary (for instance in *DP: FPIP*) where an explicit definition is given.

Within the documents examined here, the closest content to a definition of "interdisciplinary" can be found in the context of the world-studies Extended Essay. As *DP: Extended Essay Guide* states, "'Interdisciplinary' in this context refers to research that draws on the methods, concepts and theories of two Diploma Programme subjects".[206] In and of itself this is a straightforward but effective definition of what interdisciplinary learning practically means in the DP, however the fact that it is not found in a centralised location which could be taken to apply to multiple curriculum areas, and the fact that there is a very low level of detail regarding how this has been informed by research or directed by purpose, results in an embeddedness judgement of Low for EoPP 1 in the DP.

There is one segment of the *DP: FPIP* which could be argued to do some definitional work for the term "interdisciplinary", however it is not presented as a definition and is in no way extracted from the body of surrounding text. The document explains:

> "concurrency of learning, which is a vital organizational component of the DP, provides one important means of supporting interdisciplinary learning. Students are expected to make connections between different academic disciplines and not to study subjects in isolation from each other. The possibility to explore similar topics concurrently and to transfer tools or concepts from one subject to another may enable interdisciplinary understanding".[207]

Once again, the content of this passage could amount to a fair definition of some aspects of interdisciplinarity, however the wider context of its positioning and its lack of further details described by EoPP 1 prevent the embeddedness judgement from reaching Moderate.

CP Embeddedness Judgement:
In the DP embeddedness judgement for EoPP 1, the most relevant documents were noted to be the *Extended Essay Guide* and *DP: FPIP*. Neither of these documents are shared with the CP, meaning that the definitional work in those documents is not carried over to the CP embeddedness judgement. Moreover, the CP-only documents analysed here do not provide any sustained discussion of, or attempts to define, interdisciplinarity or related terms. As such, the embeddedness judgement for the CP for EoPP 1 is lower than that of the DP. However, the judgement is prevented from dropping to None by the fact that some interdisciplinary DP/CP subjects, such as Environmental Systems and Societies, contain some phrases from which a reader could infer a working definition of interdisciplinarity. Although these are not strictly definitions, phrases such as "as an interdisciplinary course, ESS is designed to combine the methodology, techniques and knowledge associated with group 4 (sciences) with those associated with group 3 (individuals and societies)" could lead a reader to understand some relevant aspects of integration. Because there is nothing resembling a full definition, the embeddedness judgement is Low and comparatively lower than the embeddedness judgement for the DP.

---

[206] *DP: Extended Essay Guide*, p. 365.
[207] *DP: FPIP*, p. 57.

- In PYP documents examined it is evident that the programme pursues a transdisciplinary curriculum, with definitions of transdisciplinarity being clear and structured around intended purpose. This therefore exhibits High embeddedness for EoPP 1.
- In the MYP documents examined, it is evident that the programme pursues an interdisciplinary structure, with definitions related to interdisciplinarity providing links to over-arching purpose, thus demonstrating High embeddedness for EoPP 1.
- Although DP documents examined include some implicit references to interdisciplinarity, there is not a central location in the documents where explicit definition of the term is discussed, and for this reason the programme demonstrates Low embeddedness for EoPP 1.
- CP-only documents examined do not provide any sustained discussion or explicit definition around interdisciplinarity and, as a result, the CP showed Low embeddedness for EoPP 1. However, the judgement is prevented from dropping to None, due to some joint interdisciplinary DP/CP subjects, which contain some references to the definitions of interdisciplinarity or related terms.

6.2.2 EoPP 2: To engage clearly and coherently with the differences and similarities between interdisciplinarity and other related terms such as multidisciplinarity and transdisciplinarity

– Although there is not one fixed definition of terms such as interdisciplinarity, multidisciplinarity, and transdisciplinarity, there should be clear engagement with the overlaps and distinctions between the meanings of such ideas. This might be achieved by offering individual definitions of each term, or it may be appropriate to provide a lengthier discussion around the issue of integration and how this may differentiate between such notions. These terms should not be used interchangeably within resources, as this has high potential to lead to confusion for stakeholders.

	EoPP 2: To engage clearly and coherently with the differences and similarities between interdisciplinarity and other related terms such as multidisciplinarity and transdisciplinarity			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	Low	None

Cross-Programme Context:
- *What is an IB Education?* provides a brief overview of the fact that the PYP contains transdisciplinary themes and suggests that these evolve into global contexts in the MYP and then subject groups in the DP/CP.[208] The document does not explicitly engage with the differences between the family of terms identified in EoPP 2.

PYP Embeddedness Judgement:
The PYP documentation assessed in the application of this benchmarking tool shows High embeddedness of the fact that transdisciplinarity (the PYP's guiding curriculum structure) should be differentiated from interdisciplinary and multidisciplinarity. In *PYP: FPIP – Learning and Teaching* lengthy definitions are given for each of these terms, including a focus on how they should be distinguished from one another. In an effective statement of this promising practice, which makes reference to important research on this topic, the document in question notes clearly that "'Transdisciplinary' is often used interchangeably with 'interdisciplinarity' and 'multidisciplinarity'. In fact, these models are not interchangeable; there are nuanced differences".[209] Choi and Pak's cooking metaphors likening interdisciplinarity to a stew, multidisciplinarity to a salad, and transdisciplinarity to a cake are drawn upon to illustrate the integration differences between the three ideas.[210] This is an accessible and effective means of illustrating the differences, and direct reference to "integration" is made elsewhere in the document.

One area where there could be scope to slightly increase embedding of EoPP 2 is in the glossary of terms found at the end of *PYP: FPIP – The Learning Community*. That glossary contains a brief definition of transdisciplinarity, but not of any directly related terms.[211] For facilitation of clarity in the minds of IB staff who use this documentation but also documents

---

[208] *What is an IB Education?,* p. 5.
[209] *PYP: FPIP – Learning and Teaching*, p. 2.
[210] *PYP: FPIP – Learning and Teaching*, p. 2.
[211] *PYP: FPIP – The Learning Community*, pp. 63-67.

from other IB programmes, it might be useful to make reference to the distinction between these terms in the glossary. However, because the PYP documentation examined here does not use these co-related terms interchangeably, and carefully structures discussion around the differences between such ideas where multiple terms are used, this absence in the glossary was not considered significant enough to lower the embeddedness judgement from High to Moderate. Also pertinent to this judgement was the fact that the differentiation offered in *Learning and Teaching* is particularly clear and housed in the programme FPIP – the main reference document for the PYP curriculum.

MYP Embeddedness Judgement:

The *MYP: FPIP* contains only a handful of references to transdisciplinarity and no references to multidisciplinarity. The references to transdisciplinarity explain that the PYP has a transdisciplinary curriculum, but *MYP: FPIP* does not go into any detail on what the differences are between interdisciplinarity and multidisciplinarity. This is potentially an oversight and something that could be corrected with the addition of a small section (even less than a page) in which some of the key differences are established in relation to integration.

Although the MYP: FPIP does not meet the standards of EoPP 2, the embeddedness judgement for this programme is nonetheless High due to the extensive relevant discussion in *MYP: Fostering Interdisciplinary Teaching and Learning* and the corresponding TSM. *MYP: Fostering Interdisciplinary Teaching and Learning* contains multiple explanations of the differences between these key terms, which are delivered clearly and effectively. For example, in Table 1 of the document, multidisciplinary, interdisciplinary, and transdisciplinary are compared in terms of their definitions, examples of what they describe, and a visual representation of each based on a Venn-diagram-like model of overlapping circles.[212] The differences between these key terms are clearly highlighted and there is substantial focus on how these notions represent different "forms of integration".[213]

MYP: Fostering Interdisciplinary Teaching and Learning TSM also contains an effective and detailed examination of the differences between interdisciplinary, multidisciplinary, and transdisciplinary. The section on "Disciplinary integration across the IB continuum" may have a slightly heavy emphasis on the DP (which is surprising for an MYP resource), but it does an effective job of differentiating the key terms in EoPP 2 and explaining the role of integration in the differences.[214] Indeed, a very similar diagram is employed to the integration arrow used by Ecctis in the literature review of this report (see section 3.1, above).

DP Embeddedness Judgement:

The embeddedness judgement for EoPP 2 in the DP is Low as a result of the fact that although there is some discussion of the ideas of interdisciplinarity, transdisciplinarity, and multidisciplinarity (particularly in the context of differences between the IB programmes), there is no evidence in the documents analysed of these terms being clearly defined, and there is some evidence of them being used together without differentiation in DP texts.

---

[212] *MYP: Fostering Interdisciplinary Teaching and Learning*, pp. 8-9.
[213] *MYP: Fostering Interdisciplinary Teaching and Learning*, pp. 16-46.
[214] *MYP: Fostering Interdisciplinary Teaching and Learning TSM*.

The main evidence (in DP documents analysed here) of discussion of the key terms in EoPP 2 comes in *DP: FPIP* when the transition between different IB programmes is discussed. In relation to the PYP it is stated that:

> "The nature of teaching and learning in the Primary Years Programme (PYP) is concept-based, transdisciplinary and largely taught by a single classroom teacher. IB World Schools have a responsibility to ensure that:
>   • there is a smooth transition from the transdisciplinary model into a model that focuses increasingly, but not exclusively on disciplinary and interdisciplinary learning". [215]

Following this, it is explained that:

> "The MYP organizes teaching and learning through eight subject groups […] In many cases, discrete or integrated disciplines may be taught and assessed within a subject group […] The distinction between subject groups blurs to indicate the interdisciplinary nature of the MYP. The subject groups are connected through global contexts and key concepts". [216]

Finally, later in the same document, it is explained that:

> "The DP is flexible enough to accommodate the needs and interests of individual students while maintaining the principle of concurrent learning of a broad and balanced curriculum. The programme is designed to be a two-year course of study with all subjects and core requirements studied concurrently. Students are expected to build a degree of interdisciplinary and transdisciplinary, as well as subject-specific, understanding." [217]

Overall, we can therefore see that the broad strokes of IB programme progression from the highly integrated and transdisciplinary PYP, to the interdisciplinary MYP, to the more subject-focussed DP (which retains potential for interdisciplinarity). However, compared to the detailed discussion of these terms found in the PYP and MYP, this DP document does not dwell on the meanings of the words in question and how they can be differentiated along the lines of integration. This lack of details lowers the embeddedness judgement.

Moreover, there are examples within *DP: FPIP* and other DP documents analysed here that these key terms are sometimes used directly alongside one another without clear explanation of the overlaps and differences. For example, later in the FPIP, it is stated that "there are several courses that have clear trans/interdisciplinary approaches within disciplines of a same subject group". [218] Although this might be true, EoPP 2 warns against using "transdisciplinary" and "interdisciplinary" without having first clearly articulated the differences. Moreover, only a few pages earlier, the FPIP suggests that "Opportunities for cross-curricular connections

---

[215] *DP: FPIP*, p. 15.
[216] *DP: FPIP*, p. 15.
[217] *DP: FPIP*, p. 57.
[218] *DP: FPIP*, p. 61.

between subjects and subject groups in the DP may result in multidisciplinary approaches".[219] Once again, although this might be a fair statement in isolation, using the term "multidisciplinary" in such close contact to the other key terms in this EoPP (without clear explanation) is likely to cause confusion among stakeholders.

CP Embeddedness Judgement:
The only comment in the CP-specific documentation examined in this benchmarking which directly links to the relationship between the terms highlighted by EoPP 2 comes towards the end of *CP: FPIP*. In a section on "Conceptual Understanding" it is suggested that:

> "Teaching through concepts encourages teachers to promote a broad approach to education that can encompass many ways of thinking, inspire a variety of experiences, and open doors to exciting and highly relevant interdisciplinary and transdisciplinary learning".[220]

This statement demonstrates one of the qualities that EoPP 2 warns against: using terms such as "interdisciplinary" and "transdisciplinary" directly next to one another without clearly defining or differentiating. Regarding explicit comments and direct use of the terms in question, the CP is not therefore showing strong embeddedness of EoPP 2.

The DP embeddedness judgement for EoPP 2 was Low, with all evidence of embeddedness being drawn from *DP: FPIP*. This is not a shared document between the DP and CP, and the *CP: FPIP* does not contain any equivalent discussions of the integration progressions between IB programmes. The CP core guides examined here also do not address EoPP 2, and none of the selected DP/CP subject guides or TSMs provide differentiation between the terms in question. As a result, the embeddedness judgement for EoPP 2 in the CP has been finalised at None.

---

[219] *DP: FPIP*, p. 57.
[220] *CP: FPIP*, p. 73.

Extracted Highlights (6.2.2)

- The PYP documentation examined shows High embeddedness for EoPP 2 because it includes references outlining clearly how transdisciplinarity (the PYP's guiding curriculum structure) should be differentiated from interdisciplinarity and multidisciplinarity.
- The MYP documentation assessed indicates that the embeddedness judgement for EoPP 2 is High due to the extensive relevant discussion in *MYP: Fostering Interdisciplinary Teaching and Learning* and the corresponding TSM, which include multiple clear explanations of the differences between interdisciplinarity, multidisciplinarity, and transdisciplinarity.
- The embeddedness judgement for EoPP 2 in the DP is Low because although there is some discussion of the ideas of interdisciplinarity, transdisciplinarity, and multidisciplinarity, there is no evidence in the documents analysed which clearly defines these terms. Additionally, the judgement is based on the fact that there is some evidence of these three terms being used together without clear differentiation.
- The CP documentation examined showed No embeddedness for EoPP 2 since the terms "interdisciplinary" and "transdisciplinary" are used in some cases directly next to one another without the inclusion of a clear definition or differentiation.

6.2.3 EoPP 3: To ensure a significant level of teacher scaffolding to help students deploy disciplines and interdisciplinarity effectively – Whilst interdisciplinarity should enable student-led inquiry, it is essential that student-led interdisciplinary inquiry is intelligently scaffolded by teachers. For example, by strategically developing "hooks" in one subject that can be activated in others, or by carefully explaining how students are carrying out interdisciplinary work through the use of disciplinary knowledge.

	EoPP 3: To ensure a significant level of teacher scaffolding to help students deploy disciplines and interdisciplinarity effectively			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	High	High

Cross-Programme Context:

- The Approaches to Teaching imply a level of scaffolding that would cross all four IB programmes. This is particularly notable in the ongoing processes of feedback suggested by the principle "Informed by Assessment" and the student-teacher collaborative relationship suggested by the principle "Focussed on Effective Teamwork and Collaboration".

PYP Embeddedness Judgement:

In general, the PYP clearly positions teachers as providers of scaffolding which enables student-led learning (especially inquiry) to be as effective as possible. In *PYP: FPIP – The Learner* it is explained that teachers of the early years in the PYP "plan, facilitate and scaffold, as well as reflecting on students' learning and their own teaching".[221] Moreover, in the PYP as a whole, the resources suggest that:

> "teachers understand that proficiency in using and applying a skill comes with practice. To achieve this, teachers model the skill and provide scaffolds when introducing a skill for the first time. They consider the multiple contexts across the units of inquiry in which students can practice and transfer skills. In goal-setting, students and teachers collaborate to identify skills for development or for further practice".[222]

This is a strong top-level description of how scaffolding could be used to allow student-led inquiry to be effective and developmentally appropriate. This is also supplemented by examples of practical steps that teachers can take to make sure that scaffolding is achieved in the most beneficial manner. One of these steps is within-class grouping:

> "Within-class grouping offers opportunities for students to interact with a wide range of peers as they move from one group to another and take on different roles to complement the background and skills of those in each group. The teacher's role is to facilitate and monitor these groupings. They provide the necessary scaffolds and prompts to ensure that students build on individual and collective strengths to maximize learning for all. Another advantage is the temporary nature of groups, where

---

[221] *PYP: FPIP – The Learner*, p. 7.
[222] *PYP: FPIP – Learning and Teaching*, p. 30.

students are assessed regularly for growth and regrouped based on their unique learning profiles and development trajectory".[223]

Through practical steps such as the constant monitoring of inquiry and tools such as within-class grouping it is evident that the PYP takes scaffolding seriously as the avenue through which student development can be optimised.

However, EoPP 3 does not only suggest that teachers should use scaffolding, but that this should be specifically used to develop the most effective form of interdisciplinary inquiry. In the PYP's case, high embeddedness of this EoPP would therefore involve explicit reference to how scaffolding supports transdisciplinary units of inquiry. This is indeed satisfied in multiple places within *PYP: FPIP – Learning and Teaching*. For example, in general terms it is described by Figure 9A in that document, which explains the sort of statements which represent effective IB team teaching:

> "The teaching team loosely pre-plans learning experiences and then modifies these as necessary to respond to student-directed questions and investigations during implementation".[224]

Besides these top-level statements, practical examples are also described in the subsection "Collaboratively Developing Units of Inquiry", where an example of a unit on a programme of inquiry is described at significant length. The questions that teachers must ask themselves (such as "Will it engage students in thinking critically and creatively? Does it present an opportunity for students to co-construct meaning of the conceptual framework being explored?"), and the nature of the guidance provided through key concepts and related concepts, clearly demonstrates that the entire transdisciplinary inquiry process is strategically scaffolded.[225]

Overall, the embeddedness judgement of EoPP 3 in the PYP is High as a result of the combination of explicit focus on scaffolding and the practical examples of how scaffolded activity would be a compulsory part of the planning and flexible implementation of the transdisciplinary units of inquiry.

MYP Embeddedness Judgement:
Teacher scaffolding of MYP interdisciplinarity is discussed in most detail and most effectively in *MYP: Fostering Interdisciplinary Teaching and Learning* and the corresponding TSM. The explicit statements found here, along with the practical examples which show how interdisciplinary scaffolding would make effective use of tools such as concept, indicates that there is High embeddedness of EoPP 3 in the MYP.

MYP: Fostering Interdisciplinary Teaching and Learning describes how various practices might contribute to effective assessment of interdisciplinary learning.

---

[223] *PYP: FPIP – The Learning Community*, p. 7.
[224] *PYP: FPIP – Learning and Teaching*, p. 19.
[225] *PYP: FPIP – Learning and Teaching*, pp. 60-61.

"For example, early in a unit teachers may invite students to solve a problem or brainstorm ideas about the unit's topic in order to assess and build students' background knowledge. Throughout the unit, teachers design disciplinary and interdisciplinary learning engagements that develop these early understandings and scaffold students' growing understanding". [226]

This is a clear and effective statement of how scaffolding can be used to build interdisciplinary understanding that also takes development of disciplinary grounding into account.

For a practical example of how teacher scaffolding can guide interdisciplinary learning in the MYP, teachers can consult the *MYP: Fostering Interdisciplinary Teaching and Learning TSM*. Under a section on "MYP Interdisciplinary Planning Process" there is link to further information on how the MYP interdisciplinary principles look in practice. The linked page, which is still part of the TSM, "illustrates what each of these qualities of interdisciplinary teaching and learning looks like in the context of a specific unit entitled 'The sound of music'". The example is an integration of physics and music, which, although it is driven by student-led inquiry (as EoPP 3 recommends), clearly evinces the role of strong and supportive scaffolding from teachers. This resource explains the nature of the scaffolding at multiple levels, but it is best summarised by the following statement:

"In MYP interdisciplinary designs, teaching strategies and learning experiences take different forms depending on where in the unit they are placed (beginning, middle or end) and whether they target disciplinary or integrative understandings. When designing interdisciplinary instruction, MYP teachers must consider what students will do throughout the unit to develop the necessary disciplinary grounding and integrate the disciplines in meaningful ways. Learning experiences become performances of understanding when students are asked to use information deliberately to create new understandings. Such performances serve two functions: they build student understandings, and they make such understandings visible and amenable for assessment. Teachers can use the information to find out how to support students further (formative assessment) and whether the unit has achieved its goals (summative assessment)". [227]

Along with the detailed discussion of concepts and inquiry processes in subject guides and TSMs, the explicit examples of scaffolding found in *Fostering Interdisciplinary Teaching and Learning* and it's TSM are clear evidence that the MYP takes scaffolding of inquiry for effective interdisciplinary learning seriously. As a result, the embeddedness judgement for EoPP 3 in the MYP is High.

DP Embeddedness Judgement:
Scaffolding is a frequently described aspect of pedagogy in the DP (in general and in reference to interdisciplinarity), to the extent that it is clearly a key approach in the curriculum that operates both within and between subjects. As such the embeddedness judgement for EoPP 3 in the DP is High.

---

[226] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 49.
[227] *MYP: Fostering Interdisciplinary Teaching and Learning TSM*.

Scaffolding is explained in the DP in many documents and resources, including in individual subject guides where that subject's specific relationship with scaffolding is given supplementary detail. For example, in *DP: Theatre Guide* it is stated that:

> "Teachers in a theatre programme need to place themselves in a different relationship to the students. They should consider themselves neither as the source of knowledge, the deliverer of information or the theatre director. Teachers should, rather, consider themselves as engineers of experiences. The teacher's role is to create opportunities that allow the students to explore, learn, discover and collaborate to become autonomous, informed and skilled theatre-makers".[228]

This level of detail is also applicable in other interdisciplinary-leaning subjects, for instance ESS. *DP: ESS TSM* contains a specific section named "facilitating the individual investigation", in which the degree and type of scaffolding needed to carry out this inherently interdisciplinary investigation in ESS is described at length.[229]

Moreover, the core of the DP also demonstrates attention to scaffolding and interdisciplinarity. In reference to TOK, the *DP: FPIP* states that:

> "TOK supports the development of interdisciplinary understanding by providing a discussion forum about the nature of knowledge and the similarities and differences in the ways that knowledge is gained in different disciplines. Links to TOK are identified in all DP subject guides, and all DP teachers are encouraged to help students to identify TOK knowledge questions in their subject lessons".[230]

The help expected for students in identifying TOK knowledge areas is an example of scaffolding within an interdisciplinary framework.

Finally, it is even evident that the scaffolding of interdisciplinary learning in the DP does not stop at the role of the classroom teacher but is also extended to other positions within an IB World School. For example:

> "Librarians are uniquely positioned to play an important and effective role in the extended essay process. As interdisciplinary educators they are able to work across subject areas to help students become lifelong learners through inquiring, gaining and creating new knowledge, and pursuing personal interests".[231]

Elsewhere, the DP coordinator is likely to have a role in ensuring that "Teachers should have opportunities to learn more about strategies such as scaffolding and the differentiation of instruction as part of their professional development".[232]

---

[228] *DP: Theatre Guide*, p. 15.
[229] *DP: ESS TSM*.
[230] *DP: FPIP*, p. 61.
[231] *DP: Extended Essay Guide*, p. 50.
[232] *DP: FPIP*, p. 32.

CP Embeddedness Judgement:

Part of the high embeddedness judgement for EoPP 3 in the DP stemmed from subject guides such as *DP: Theatre Guide* and subject TSMs such as *DP: ESS TSM*. This evidence is equally applicable to the CP and therefore indicates significant embeddedness of EoPP 3 in the CP as well.

The evidence in DP/CP joint documentation is supported by further evidence in CP-specific documentation. In *CP: FPIP*, for example, there are multiple references to the importance of scaffolding and its prioritisation in pedagogy.[233] Elsewhere, the Reflective Project provides a clear example of a project-based or inquiry-based curriculum component which may involve interdisciplinarity and will draw on scaffolding in order to develop effectively. The *CP: Reflective Project Guide* states that "Schools are encouraged to help students to recognize and make use of the links between all strands of their CP in order that the Reflective Project can be a formal representation of their studies overall".[234] Scaffolding in the Reflective Project is perhaps best exemplified by the existence of the "Reflections on Planning and Progress Form". As the guide explains, "During the project, students have three formal meetings with their supervisor to discuss their planning, progress and any concerns they have. After each meeting they complete the specified section of the RPPF".[235]

The evidence of embeddedness of EoPP 3 in joint DP/CP documentation is therefore clearly supplemented by details within the *CP: FPIP* and documentation related to the CP core. As a result, the embeddedness judgement for EoPP 3 in the CP is High.

Extracted Highlights (6.2.3)

- The High embeddedness for EoPP 3 in the PYP is due to the explicit focus of the programme on scaffolding and the inclusion of practical examples in PYP documents. These documents explain how scaffolded activities are a compulsory part of the planning and flexible implementation process for the transdisciplinary units of inquiry.
- The MYP documents examined indicate High embeddedness of EoPP 3 as they provide explicit statements regarding the scaffolding of interdisciplinary learning, with some documents offering practical examples on the scaffolding of inquiry for interdisciplinary learning.
- The DP documents assessed show High embeddedness of EoPP 3 as scaffolding is a frequently described aspect of pedagogy in the DP (in general and in reference to interdisciplinarity), as well as a key approach in the curriculum that operates both within and between subjects.
- Evidence from CP-specific and DP/CP joint documentation shows High embeddedness of EoPP 3 as there is clear focus on scaffolded approaches to project-based or inquiry-based curriculum components which may involve interdisciplinarity.

---

[233] *CP: FPIP*, pp. 34, 79-80.
[234] *CP: Reflective Project Guide*, p. 7.
[235] *CP: Reflective Project Guide*, pp. 13-14.

6.2.4 EoPP 4: To explicitly link interdisciplinary learning with other features of constructivist pedagogy, including concept-based teaching, student-led inquiry, collaboration, and authentic learning

– At the level of stated aims and methods of teaching and learning, interdisciplinary learning should be explicitly described as part of a wider spectrum of progressive constructivist pedagogy. The ideas to link with interdisciplinarity include conceptual understanding, student-centred learning, inquiry, collaboration, learning structured around authentic and real-world issues, and awareness of other perspectives and cultures. It is important to link these pedagogic approaches at multiple levels, but this Element of Promising Practice focuses at the top level of the stated headline aims and approaches to teaching and learning.

	EoPP 4: To explicitly link interdisciplinary learning with other features of constructivist pedagogy, including concept-based teaching, student-led inquiry, collaboration, and authentic learning			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	High	High

Cross-Programme Context:

- See section 4.2 (above) for a detailed breakdown of the extent to which interdisciplinary learning / interdisciplinarity is embedded both implicitly and explicitly in the Learner Profile, Approaches to Teaching, and Approaches to Learning. In the case of all three of these curriculum components, Ecctis' analysis has found both explicit and implicit links to interdisciplinary learning. This underpinning pedagogic framework establishes a high foundational level for embeddedness of interdisciplinary learning into all IB programmes, and clearly interweaves interdisciplinarity with many other features of constructivist pedagogy.

PYP Embeddedness Judgement:

The cross-programme context – including the way in which interdisciplinarity (or, indeed, further integration under the label of transdisciplinarity) is entwined with the IB curriculum components such as the LP, ATT, and ATL – provides a strong foundation for the PYP to have high embeddedness of EoPP 4. In addition to those cross-programme factors, embedding of EoPP 4 was also found in multiple places throughout the PYP documents analysed. Indeed, it was a common feature emerging consistently across multiple subsections of all pillars of *PYP: FPIP*. As would be expected (because this EoPP relates directly to pedagogy), this EoPP was particularly strongly embedded in the *PYP: FPIP – Learning and Teaching*, although it is also interesting to note that it features heavily in descriptions of the Exhibition, found in the *PYP: FPIP – The Learner*.

The scattered links between transdisciplinary learning and other elements of constructivist pedagogy often take the form of statements embedded within wider discussions of the curriculum. For example, *PYP: FPIP – Overview*, states that:

> "The PYP curriculum framework centres on transdisciplinary learning as the curriculum organizer for students to experience learning between, across and beyond traditional

subject boundaries. It is an in-depth guide to authentic inquiry-based learning and teaching that is engaging, significant, challenging and relevant". [236]

This clearly links the transdisciplinarity of the curriculum to student-centred, authentic, inquiry-based learning. Elsewhere, *The Learner* also features a table in which Learner-Profile-based statements encapsulate the attitudes of students who take actions for a better world. These often link subject-integration with other elements of constructivist pedagogy such as authentic, student-centred, and real-world learning. For instance, one states "I can recognize and understand the interconnections and interdependence of opportunities and challenges of local, global significance and use critical and creative thinking to address them". [237]

The description of the Exhibition also provokes clear links between transdisciplinarity and constructivist pedagogy. *The Learner* describes implementation of the Exhibition at length and includes statements such as:

> "All Exhibition students aim to: […] participate in selecting a real-life issue or opportunity for the exhibition […], develop their inquiry by collaborating on the central idea, lines of inquiry and student questions with teachers […], explore knowledge and conceptual understandings that are significant, relevant, challenging and engaging". [238]

These statements and many others in the same context show that constructivist principles are being inextricably enmeshed with what is fundamentally a transdisciplinary project.

Finally, the EoPP is clearly strongly embedded in *Learning and Teaching* on multiple occasions. One example is the section describing "A Transdisciplinary Programme of Inquiry", where constructivist pedagogic principles are explicitly related to integration of disciplines. The section summary states that "A transdisciplinary programme of inquiry offers students a broad, balanced, conceptual and connected learning experience. […] Units of inquiry are collaboratively planned, developed and continually modified based on reflection with students". [239] Such statements bring multiple elements of constructivism together with transdisciplinarity and underscore why the PYP has been judged to have High embeddedness of EoPP 4.

MYP Embeddedness Judgement:
The links between the MYP's interdisciplinary curriculum approaches and other features of constructivist pedagogy are already established at a strong level by the cross-programme context of the way that interdisciplinarity is embedded in the curriculum components such as the LP, ATT, and ATL (see section 4.2, above). However, the embedding of EoPP 4 is also strengthened by content within specific MYP documents such as the FPIP, *Fostering Interdisciplinary Teaching and Learning*, and other subject-area guides. The combination of these features leads to embeddedness judgement of High for EoPP 4.

---

[236] *PYP: FPIP – Overview*, p. 3.
[237] *PYP: FPIP – The Learner*, p. 36.
[238] *PYP: FPIP – The Learner*, p. 42.
[239] *PYP: FPIP – Learning and Teaching*, p. 57.

One of the most important MYP documents for explaining this relationship between interdisciplinary and other aspects of constructivism is *MYP: Fostering Interdisciplinary Teaching and Learning*. For example, in a description of the circular diagram that represents the MYP curriculum, it is explained that:

> "Approaches to teaching and learning, concepts and global contexts are reflected as central elements of the programme that guarantee a 'common language' for all subject groups and enable interdisciplinary connections across disciplines. They establish meaningful connections between what students learn inside the classroom and the world beyond. Contexts and concepts are essential components for promoting holistic learning". [240]

Moreover, a section addressing "Possible entry points to interdisciplinary planning" includes suggestions such as "Entering through concepts", "Entering through global contexts", and "Entering through content that invited the integration of multiple disciples". The first two of these options are clearly related to constructivist principles (conceptual understanding and global/authentic contexts) and the description of the third directly links it to "interdisciplinary inquiry". [241]

MYP: Fostering Interdisciplinary Teaching and Learning has the most detailed explanations of the pedagogic links relevant to EoPP 4, but page 12 of some of the individual subject guides also provides some level of detail along the same lines, relating interdisciplinary learning to conceptual understanding, inquiry, collaboration, and authentic contexts. Similarly, the *MYP: FPIP* has a section on the "Inquiry-based curriculum" which articulates many of these links and uses the term "constructivism" to provide the appropriate framing. [242]

DP Embeddedness Judgement:
The cross-programme context of the curriculum components such as the LP, ATT, and ATL already establishes the EoPP 4 embeddedness level as at least Moderate for all IB programmes. Although the DP documents examined here do not contain as much explicit and extensive discussion of the pedagogic links between interdisciplinarity and other aspects of constructivism as the PYP and MYP documents, there is at least scattered reference across a wide number of documents. As such, the embeddedness judgement is raised to High.

One of the DP resources which describes interdisciplinarity's place within constructivist pedagogy in most detail is *DP: Extended Essay Guide* – specifically, the sections of this long resource which address the world-studies Extended Essay (which is intended to be interdisciplinary by design). A world-studies Extended Essay, according to this document:

> "provides an opportunity for students to conduct independent interdisciplinary research (not necessarily primary research) that draws on Diploma Programme subjects and

---

[240] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 6.
[241] *MYP: Fostering Interdisciplinary Teaching and Learning*, pp. 21-32
[242] *MYP: FPIP*, p. 73.

integrates them to produce a coherent and insightful analysis of the global issue they choose to investigate".[243]

This statement articulates links between authentic/real-world issues, student-led inquiry and interdisciplinarity.

Elsewhere, *DP: FPIP* also links interdisciplinarity to student-led inquiry and conceptual understanding, and the latter of those is also underscored by *DP: Language B Guide*'s linking of conceptual understanding with students building on their own experiences and using this to cross subject lines.[244] Moreover, in *DP: Theatre Guide*, links between interdisciplinarity and ongoing processes of student inquiry and reflection (guided by authentic contexts) are highlighted.

> "The arts subjects complement TOK ethos by revealing interdisciplinary connections and allowing students to explore the strengths and limitations of individual and cultural perspectives. Studying the arts requires students to reflect on and question their own bases of knowledge".[245]

Overall, these comments may not cover every element of constructivist pedagogy described in EoPP 4, but they act as useful reminders of the ideas linked at many levels throughout the IB's curriculum components at a cross-programme level. Importantly, the examples described here are only a small selection of the content within DP resources which links interdisciplinary learning with other aspects of the IB's pedagogy. In other resources, such as *DP: TOK Guide*, for example, isolated quotations may not summarise the links as clearly but the structure of this component of the core evidently draws student-led inquiry (for instance) into a context which is likely to cross disciplinary boundaries.[246]

CP Embeddedness Judgement:
The cross-programme context already evidences embeddedness of at least a Moderate level for all IB programmes, including the CP. On top of this, some evidence from joint DP/CP documentation can be carried-over from the DP embeddedness judgement for EoPP 4 – for example the comments in *DP: Theatre guide*. However, the DP judgement also rested on some evidence from DP-specific documentation, so it is worth verifying that similar or equally valid comments can also be found in CP-specific documentation in order to prove an embeddedness level of High.

The most relevant section of the CP-specific documentation analysed in this benchmarking is the Teaching and Learning section of *CP: FPIP*. This provides explanations of how each of the Approaches to Teaching principles are deployed in the CP context. In this section there is a missed opportunity to describe integration more directly, perhaps with reference to terms such as interdisciplinarity or multidisciplinarity. However, the sub-section addressing conceptual understanding does show clearly how "appreciation of ideas that transcend

---

[243] *DP: Extended Essay Guide*, p. 365.
[244] *DP: FPIP*, p. 57; *DP: Language B Guide*, p. 23.
[245] *DP: Theatre Guide*, p. 8.
[246] *DP: TOK Guide*.

disciplinary boundaries" interacts with other features of constructivist pedagogy discussed in detail within adjacent subsections.[247]

Overall, the embeddedness of this EoPP is not quite as high in the CP as in the DP, due to the fact that CP-specific documentation does not contain as many explicit references to the links between interdisciplinarity and other aspects of constructivist pedagogy. However, the judgement is still High due to the combination of cross-programme context with pedagogic discussion in the conclusion of the programme FPIP.

<div style="border:1px solid">

Extracted Highlights (6.2.4)

- Cross-programme and programme-specific documentation examined indicates that elements of constructivist pedagogy are established across all programmes with a particularly clear links to transdisciplinary approaches in the PYP.
- High embeddedness for EoPP 4 is evident in the MYP, as the documentation examined includes references to interdisciplinary learning through the lenses of constructivist pedagogies including inquiry-based learning.
- Although the DP documents examined do not contain *explicit* information on the pedagogic links between interdisciplinarity and other aspects of constructivism, there are some references which implicitly associate interdisciplinarity with elements of constructivist pedagogy such as conceptual understanding, inquiry, and reflection. For this reason, the DP showed High embeddedness for EoPP 4.
- CP-specific documentation does not contain many explicit references to the links between interdisciplinarity and other aspects of constructivist pedagogy. However, there is High embeddedness for EoPP 4 due to the combination of the cross-programme context and a pedagogic discussion in the conclusion of the programme FPIP (which describes elements such as conceptual understanding and integration).

</div>

---

[247] *CP: FPIP*, pp. 71-80.

6.2.5 EoPP 5: To clearly articulate and communicate, to staff and students, the value and benefits of interdisciplinary learning

– Understanding the value and benefits of interdisciplinary learning and developing enthusiasm in both staff and students, leading to more effective embedding of interdisciplinarity. The values and benefits which could be communicated include (but are not limited to) interdisciplinary learning's ability to support and develop other elements of constructivist pedagogy, the evidence of benefits to student understanding, improved engagement, and better preparedness for the nature of further/higher education and the world of work.

	EoPP 5: To clearly articulate and communicate, to staff and students, the value and benefits of interdisciplinary learning			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	Moderate	Moderate

Cross-Programme Context:

- *What is an IB Education?* does not explicitly discuss the value and benefits of interdisciplinary learning in significant detail, but there are some comments from which readers would be likely to extract some level of understanding of interdisciplinary learning's value and benefits in the IB. This is most notable in the section named "A broad, balanced, conceptual and connected curriculum", which at least implicitly links the crossing of disciplinary boundaries with the ability to authentically understand a rapidly changing world. [248]

PYP Embeddedness Judgement:

Expressions of the value and benefits of transdisciplinary learning are a consistent feature of all pillars of the *PYP: FPIP*. As described by EoPP 5, this is highly likely to breed enthusiasm for transdisciplinarity among staff and (through a trickle-down process) students. Specifically, the benefits of transdisciplinary learning espoused in these documents include many areas described in the academic literature, such as integration's relationship with authenticity, preparation for real-world situations, and more.

Perhaps one of the most frequently described benefits of transdisciplinary learning (as described by PYP documentation analysed here) is its ability to help students see the world from multiple perspectives and therefore become more internationally-minded and aware of others. As stated in *PYP: FPIP – The Learner*:

> "to facilitate students' openness to others and to the world, the Primary Years Programme (PYP) offers opportunities to inquire into human commonalities through the transdisciplinary themes. Being willing to see beyond local boundaries is also essential for intercultural understanding". [249]

Part of this benefit of becoming internationally-minded through an integrated curriculum is also that students will become prepared for a constantly changing real world. As *PYP: FPIP – Overview* states, the development of conceptual understandings (which is intricately linked to

---

[248] *What is an IB Education?*, p. 5.
[249] *PYP: FPIP – The Learner*, p. 22.

the PYP's transdisciplinary themes) enables students to "demonstrate the agility and imagination to respond to new and unexpected challenges and opportunities and to take actions for a better and more peaceful world."[250] Later in the same document, the authenticity of transdisciplinarity is linked to genuine local contexts, not only global or international ones. [251]

Most importantly, *PYP: FPIP – Learning and Teaching* goes into significant detail about why a transdisciplinary curriculum is a good choice for a primary years programme, and how it confers a whole range of pedagogic and personal benefits on learners. The level of detail in that document is impressive, and the visible research clearly shows an engagement with a large proportion of the values and benefits described in the literature review of this report. [252] As a result, it is clear that the embeddedness judgement for EoPP 5 in the PYP is High.

MYP Embeddedness Judgement:
The value and benefits of interdisciplinary learning in the MYP are effectively and coherently articulated in *MYP: Fostering Interdisciplinary Teaching and Learning*. At the start of that document, indeed on page 2, a dedicated section of the introduction specifically addresses the "Importance of interdisciplinary teaching and learning". Along with a textual description – which highlights the fact that interdisciplinarity helps students to meet the challenges of "a complex and highly interconnected world" – there is also a table that clearly delineates "benefits for students" and "benefits for teachers". This list is a clear and well-located description of the value and benefits of interdisciplinary learning.

However, *MYP: Fostering Interdisciplinary Teaching and Learning* is not the only document analysed in this benchmarking which contributes to the MYP's discussion of the value and benefits of interdisciplinarity. There are also scattered references which can be found across many of the subject guides. For example, in the middle of a section on "Planning the language and literature curriculum", *MYP: Language and Literature Guide* states that:

> "Language and literature courses offer many opportunities to build interdisciplinary connections across the curriculum. Horizontal articulation for each year of the programme should coordinate teaching and learning across courses in language and literature, as well as identify shared conceptual understandings and approaches to learning (ATL) that span multiple subject groups and help to create a coherent learning experience for students throughout the year". [253]

This statement includes references to the fact that interdisciplinarity dovetails effectively with a constructivist pedagogy that uses concepts, and to the fact that allowing topics to span disciplines creates a more coherent learning experience. This is just one example of the type of scattered reference which can be found in the subject guides. Along with the detailed discussion in *MYP: Fostering Interdisciplinary Teaching and Learning*, these accumulate to an embeddedness judgement of High for EoPP 5 in the MYP.

---

[250] *PYP: FPIP – Overview*, p. 3.
[251] *PYP: FPIP – Overview*, p. 4.
[252] *PYP: FPIP – Learning and Teaching*, pp. 2-25.
[253] *MYP: Language and Literature Guide*, p. 16.

DP Embeddedness Judgement:

There are scattered references to the value and benefits of interdisciplinary learning in the DP documentation analysed here. In some strategic places, for example in *DP: FPIP*, there are missed opportunities to satisfy the requirements of this EoPP more explicitly. As a result of the fact that some values and benefits are articulated, but not necessarily in a well-flagged manner or with clear presentation, the embeddedness judgement for EoPP 5 in the DP is Moderate.

An example of a place where the value and benefits of interdisciplinary learning are well articulated within DP documentation is the *Environmental Systems and Societies Guide*, where it is stated that:

> "ESS is a complex course, requiring a diverse set of skills from its students. It is firmly grounded in both a scientific exploration of environmental systems in their structure and function and in the exploration of cultural, economic, ethical, political, and social interactions of societies with the environment. As a result of studying this course, students will become equipped with the ability to recognize and evaluate the impact of our complex system of societies on the natural world". [254]

This statement clearly articulates that the combined methodologies and knowledge content of an interdisciplinary subject will provide students with the practical benefit of being able to understand and analyse complex real-world systems. As such, this is an effective explanation of the fact that interdisciplinary learning has the benefit of facilitating authentic learning based on real-world contexts. Similarly, in *DP: TOK Guide* the summary of the nature of that component of the core states that "TOK emphasizes comparisons and connections between areas of knowledge and encourages students to become more aware of their own perspectives and the perspectives of others". [255]

Another place where some of the benefits of interdisciplinary learning are articulated is the dedicated section on "conceptual understanding" towards the end of *DP: FPIP*. This section highlights some of the pedagogic and metacognitive benefits of interdisciplinarity, with reference to appropriate research. However, this section focuses explicitly on conceptual understanding and does not clearly draw the link between concepts and interdisciplinarity. In the *PYP: FPIP* and *MYP: FPIP* this link is well articulated, but this section in *DP: FPIP* does not draw that link as clearly as it could. [256] As such, this section contains some appropriate content for EoPP 5, but does not contextualise it so as to show how interdisciplinarity leads to these benefits.

On the other hand, an earlier section of *DP: FPIP* – "disciplinary and interdisciplinary understanding" – provides some indication that interdisciplinarity might take place in the DP but does not take the opportunity to articulate the values and benefits of interdisciplinary learning. [257] By mixing some of the content of the later section on conceptual understanding

---

[254] *DP: ESS Guide*, p. 6.
[255] *DP: TOK Guide*, p. 4.
[256] *DP: FPIP*, pp. 70-72.
[257] *DP: FPIP*, p. 57.

with this earlier section, the document could satisfy EoPP 5 to a higher level. However, because the references to the value and benefits of interdisciplinary learning are scattered and rarely explicit, the embeddedness judgement is Moderate.

CP Embeddedness Judgement:

The embeddedness judgement for EoPP 5 in the CP very much reflects that of the DP. The strongest evidence for embeddedness of this promising practice for the DP came in the ESS guide, which is shared by the CP and therefore the same evidence can be carried across to this judgement. Similarly, the part of the *DP: FPIP* that was found to satisfy this EoPP most was the section at the end focussing on conceptual understanding, for which there is a direct equivalent at the end of *CP: FPIP*. As the CP-specific documents analysed here do not contain any further evidence of embeddedness of EoPP 5, the judgement has been finalised at Moderate.

<div style="border:1px solid #7a2020; padding:10px;">

Extracted Highlights (6.2.5)

- PYP and MYP documents examined indicate several references to the benefits and value of transdisciplinarity (in the case of PYP) and interdisciplinarity (in the case of MYP) in an effective and coherent way which shows potential to increase the understanding and buy-in of stakeholders. For this reason, the PYP and MYP showed High embeddedness for EoPP 5.
- DP and CP documentation assessed shows that although some values and benefits of interdisciplinarity are articulated, they are not always presented in a clear and systematic way but more through implicit and scattered references across documents. For this reason, the embeddedness judgement for EoPP 5 is Moderate in both the DP and CP.

</div>

6.2.6 EoPP 6: To promote the use of authentic problem-solving and interdisciplinary project-based learning as two key tools for developing interdisciplinarity in the classroom

– Problem-solving and project-based learning are both closely linked to effective constructivist pedagogy, enabling student-led inquiry and authentic learning. Both are also key practical conduits for interdisciplinary learning, in which students can develop organic links between disciplines by addressing real-world problems and using their conceptual understanding to carry-out projects which cross the boundaries of the subjects they are studying.

	EoPP 6: To promote the use of authentic problem-solving and interdisciplinary project-based learning as two key tools for developing interdisciplinarity in the classroom			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	High	High

Cross-Programme Context:
- See section 4.2 (above) for a detailed breakdown of how interdisciplinary learning is implicitly and explicitly articulated in many elements of the IB curriculum components (LP, ATT, ATL). One of the means through which interdisciplinary learning is related to those curriculum components is through project-based learning and authentic problem-solving. This can be seen, for example, in the ATL skill "Research Skills", in the ATT principle "Based on Inquiry", and in the LP attribute "Inquirers".
- *What is an IB Education?* includes a brief explanation of the fact that there is a thread of culminating *projects* throughout all four IB programmes: "All four IB programmes also require the completion of a culminating project: the PYP exhibition; the MYP personal project or community project; the DP extended essay; the CP Reflective Project. These projects provide an opportunity for students to both deepen and showcase their knowledge, understandings and skills, and to celebrate their learning journeys".[258]

PYP Embeddedness Judgement:
There is substantial evidence that the PYP curriculum makes substantial use of authentic problem-solving and project-based learning in order to deliver its transdisciplinarity. A strong foundation for these pedagogic approaches is created by the interaction between these methods and disciplinary integration in the main curriculum components such as the LP, ATT, and ATL (see section 4.2, above). Authenticity, creative problem solving, and authentic extended inquiry are all written into those curriculum components and thereby help to shape the PYP's transdisciplinary curriculum. However, this foundation of the curriculum components is amplified by repeated references to problem-based learning in the PYP and the fact that the Exhibition is a strong example of inquiry-driven, project-based pedagogy. Combining these factors, it is evident that the PYP has High embeddedness of EoPP 6.

It is stated in *PYP: FPIP – Learning and Teaching* that "transdisciplinarity transcends subjects. It begins and ends with a problem, an issue or a theme. Students' interests and questions

---

[258] *What is an IB Education?*, p. 5.

form the heart of transdisciplinary learning."[259] This statement clearly indicates that transdisciplinarity and problem-based learning are inextricably entwined in the PYP. Moreover, later in the same document, it is explained in relation to the transdisciplinary themes which shape the curriculum, that "taken together, these themes provide students with authentic learning experiences that are not confined to the boundaries of traditional subjects because real-world problems have no boundaries".[260] Such statements, of which these two are merely selected examples from among many in the PYP documentation examined here, clearly show how authenticity, problem-solving, and inquiry are key shaping forces in the PYP.

In relation to project-based learning, the PYP Exhibition demonstrates clearly that this is an actively used pedagogic tool in the PYP's transdisciplinary curriculum. The glossary definition of the Exhibition describes it as "a culminating and consolidating learning experience or inquiry project in which students, with the support of a mentor, demonstrate their understanding of an issue or opportunity that they have selected and investigated, both individually and with their peers."[261] The fact that all PYP students develop an Exhibition project, and that this is designed to make the most of inquiry-based responses to authentic problems, demonstrates that the PYP's embedding of EoPP 6 is at a High level.

MYP Embeddedness Judgement:
Both project-based learning and problem-solving are pedagogic devices used repeatedly in the MYP, as evidenced by a range of resources analysed in this benchmarking process. Unsurprisingly, the best evidence for use of project-based learning is in *MYP: Projects Guide*. Problem-solving, on the other hand, features throughout many of the subject guides. The cumulation of this evidence across a range of documentation results in an embeddedness judgement of High for EoPP 6 in the MYP.

MYP: Projects Guide describes and gives guidance on both the community project and the personal project. The MYP projects are of course not only in place in the curriculum for their ability to effectively contribute to interdisciplinary learning; as the guide makes clear "the objectives of MYP projects encompass the factual, conceptual, procedural and metacognitive dimensions of knowledge".[262] In fact, although close reading of *MYP: Projects Guide* as a whole makes it clear that both projects are highly likely to be interdisciplinary, the actual word "interdisciplinary" (or any other iteration of that term) does not feature in the document. This is an oversight that could be easily rectified, because the *idea* of interdisciplinarity is clearly within this guide in other forms. For instance, it is stated that "developing an area of personal interest beyond the subject-specific curriculum" is a key element of the personal project.[263] Although there is clear scope for adding explicit mention of interdisciplinarity to the Projects Guide, this does not detract from the fact that, as suggested by EoPP 6, project-based learning is a key part of the curriculum.

Regarding problem-solving, there is evidence for this pedagogic device across a range of documents analysed in this benchmarking. At the start of most subject guides, for instance

---

[259] *PYP: FPIP – Learning and Teaching*, p. 2.
[260] *PYP: FPIP – Learning and Teaching*, p. 4.
[261] *PYP: FPIP – The Learning Community*, p. 64.
[262] *MYP: Projects Guide*, p. 8.
[263] *MYP: Projects Guide*, p. 19.

MYP: Language and Literature Guide, it is stated that interdisciplinary learning in the MYP should be "purposeful—connecting disciplines to solve real-world problems, create products or address complex issues in ways that would have been unlikely through a single approach".[264] This statement is found in multiple documents and directly explains that authentic problems will be used to structure interdisciplinary inquiry in the MYP. This emphasis is repeated a few pages later in relation to conceptual understanding, when it is stated that "students use conceptual understanding as they solve problems, analyse issues and evaluate decisions that can have an impact on themselves, their communities and the wider world".[265] Beyond these specific examples, *MYP: Mathematics Guide* also has extensive discussion of how learning in that subject area is problem-based, and page 32 of *MYP: Fostering Interdisciplinary Teaching and Learning* contains a detailed table of examples explaining how problems can be used as entry-points to learning that stretches across disciplines.[266]

DP Embeddedness Judgement:
Both problem-solving and project-based learning are unequivocally flagged as key approaches to teaching and learning in the DP. Although they are not always discussed explicitly as a part of an interdisciplinary curriculum, there is nonetheless substantial evidence that interdisciplinary learning would be made possible by these two pedagogic methods. As a result, the embeddedness judgement for EoPP 6 in the DP is High.

Project-based learning might take place across nearly the entire DP curriculum. One example from the documentation examined here is CAS projects, described in *DP: CAS Guide*. Indeed, that document explains that "a CAS project challenges students to show initiative, demonstrate perseverance, and develop skills such as those of cooperation, problem-solving and decision-making", showing that CAS has elements of both problem-based and project-based learning.[267] The fact that CAS projects involve a genuinely complex project structure is highlighted by the suggestion that "students will likely identify more outcomes, or modify expected outcomes during the CAS project and/or at its completion".[268] CAS projects may involve interdisciplinarity, though that is not necessarily a defining aspect of their design. The world-studies Extended Essay on the other hand, as described in *DP: Extended Essay Guide*, is interdisciplinary by design and clearly develops in the pattern of a student-driven yet scaffolded project. Elsewhere, interdisciplinary subjects such as Environmental Systems and Societies also give indications of sometimes using a project-based model on their curricula.[269]

Problem-based learning is also evident in the DP across a number of the sources examined here, including *DP: CAS Guide* as described above. In *DP: Mathematics Applications and Interpretation TSM* it is explained that the inquiry-based approach involves both "problem and project-based learning".[270] Once again, naturally interdisciplinary subjects such as Environmental Systems and Societies also demonstrate a link between interdisciplinarity and problem-based teaching. *DP: ESS Guide* suggests that:

---

[264] *MYP: Language and Literature Guide*, p. 12.
[265] *MYP: Language and Literature Guide*, p. 18.
[266] *MYP: Fostering Interdisciplinary Teaching and learning*, p. 32.
[267] *DP: CAS Guide*, p. 24.
[268] *DP: CAS Guide*, p. 24.
[269] *DP: ESS Guide*, p. 16.
[270] *DP: Mathematics Applications and Interpretation TSM*, p. 4.

"the interdisciplinary nature of the course requires a broad skill set from students and includes the ability to perform research and investigations and to participate in philosophical discussion. The course requires a systems approach to environmental understanding and problem-solving, and promotes holistic thinking about environmental issues". [271]

Here and elsewhere, problem-based approaches are clearly found in the context of what is likely to be interdisciplinary teaching and learning. [272]

CP Embeddedness Judgement:

Much of the evidence for problem-based learning for EoPP 6's embeddedness judgement in the DP can be directly carried over to this CP judgement, due to the fact that the evidence stems from joint DP/CP resources such as *DP: ESS Guide* and *DP: Mathematics Applications and Interpretation TSM*. However, the project-based evidence for the DP largely came from CAS and the Extended Essay (elements of the DP core which are not shared by the CP), therefore the CP-specific documentation needs to be considered for equivalent evidence in order to sustain the High embeddedness judgement in the CP.

The Reflective Project does indeed provide evidence that the CP embeds EoPP 6's recommendation of the use of project-based learning. *CP: Reflective Project Guide* does not explicitly link to interdisciplinarity, but it clearly shows that project-based learning (which is encouraged to make links to other areas of study) would be an important element of the CP curriculum. The five themes of the Reflective Project, although not flagged as interdisciplinary, demonstrate a high likelihood of drawing (even if only tangentially) upon a wide range of subject areas. The themes in question are: personal development, intercultural understanding, effective communication, thinking processes, and applied ethics. [273]

Overall, taking into account the evidence from DP/CP resources on problem-based learning, and the CP-specific evidence of project-based learning, it is evident that the embeddedness judgement for EoPP 6 in the CP is High.

---

[271] *DP: ESS Guide*, p. 6.
[272] *DP: FPIP*, p. 61.
[273] *CP: Reflective Project Guide*, p. 10.

- The PYP curriculum and especially the PYP Exhibition makes substantial use of authentic problem-solving and project-based learning, and authentic extended inquiry to deliver its transdisciplinarity. For this reason, the programme showed High embeddedness for EoPP 6.
- The MYP curriculum documents (for example the *MYP: Projects Guide*) focus on problem-solving and project-based learning as key elements towards interdisciplinary inquiry, and for this reason the programme showed High embeddedness for EoPP 6.
- Although problem-solving and project-based learning are not always discussed explicitly as a part of the DP curriculum, DP documentation examined such as the *DP: CAS Guide* and the *DP: ESS Guide* indicated that these are two key pedagogical approaches to deliver interdisciplinary learning. For this reason, the DP showed High embeddedness for EoPP 6.
- The combination of evidence from the joint DP/CP resources (which include elements of problem-based learning) and CP-specific documentation focusing on project-based learning (notably the CP Reflective Project) indicate High embeddedness for EoPP 6.

6.2.7 EoPP 7: To create sufficient flexibility in the curriculum for teachers to authentically link learning to student interests and new research developments, and to reflectively develop best practice approaches – A curriculum with very high levels of prescribed content and teaching methods will not contain sufficient flexibility for teachers to tailor learning to student interests and new areas of exploration in research/industry – both of which are key areas for effective interdisciplinary learning to be developed. Moreover, if teachers are enabled to be flexible, they can develop innovative and promising practice approaches to interdisciplinarity through collaboration and personal development.

	EoPP 7: To create sufficient flexibility in the curriculum for teachers to authentically link learning to student interests and new research developments, and to reflectively develop best practice approaches			
Programme:	PYP	MYP	DP	CP
Embeddedness:	Moderate	High	High	High

Cross-Programme Context:
- Forming links to student interests is a quality embedded in multiple aspects of the IB curriculum components (LP, ATT, ATL) analysed at length in section 4.2 (above). Specifically, this link is evident in the LP attributes "Open-Minded" and "Reflective", and the ATT principle "Designed to Remove Barriers to Learning". The fact that teachers are also expected to model these curriculum component elements suggests that teachers reflectively developing best practice (as recommended by EoPP 7) may be enabled by LP attributes such as "Reflective". Regarding linking the curriculum to new research development (as recommended by EoPP 7), the same could be said for ATL skills such as "Research Skills".

PYP Embeddedness Judgement:
There are three key pillars to EoPP 7: flexibility to enable student interests to inform the curriculum; flexibility to enable new research and academic findings to be embedded into the curriculum; and flexibility to enable teaching staff to develop new and improved practice through collaboration and self-reflection.

One of the terms defined at the end of *PYP: FPIP – The Learning Community* is "engaging". This is because the PYP curriculum is supposed to involve "learning and teaching that is reflective and responsive to personal and collective interests".[274] Indeed, "interest" or "interests" is referenced more than 70 times across the entire *PYP: FPIP*, and the vast majority of these statements suggest that teaching and learning should be driven by an awareness of what students are interested in and the fact that how those interests develop should impact the progress of transdisciplinary inquiry. There is clearly high embeddedness of this element of the EoPP in the PYP.

One of the roles that *PYP: FPIP – The Learner* states that PYP teachers fulfil is "researcher", however there is not extensive, explicit commentary on how teachers should build research

---

[274] *PYP: FPIP – The Learning Community*, p. 64.

into their teaching roles. [275] In *PYP: FPIP – The Learning Community* it is explained that teachers "inquire into their practice, seeking answers through professional development and reading, and action research", and that schools should be "encouraging teachers to see themselves as researchers, and supporting their inquiries into pedagogy". [276] As with some other EoPPs which relate to professional development, PYP documentation indicates some very valuable avenues that CPD might take (for example enabling teachers to take part in action research) but it is not presented as a mandatory component of the curriculum. As such, it is possible that some PYP teaching would highly embed this aspect of EoPP 7, but it is not guaranteed in all cases.

For the final element of curriculum flexibility (enabling teacher-teacher collaboration and self-reflection on practice) we can turn to the PYP's embeddedness judgement for EoPP 18 – as that EoPP gives detailed scrutiny to the capacity for teacher-teacher collaboration leading to reflective improvements in transdisciplinary teaching. The judgement on EoPP 18 in the PYP is Low, but this aspect of EoPP 7 might be considered moderate. This is because there is evidence of sufficient curriculum flexibility to enable these activities, it is simply not a guaranteed practical outcome (hence the Low judgement on EoPP 18).

Overall, given that the PYP provides clear flexibility that enables student interests to be pursued, but only moderate evidence of flexibility designed to enable research-driven developments and reflection on practice, the final judgement of EoPP 7 in the PYP is Moderate.

MYP Embeddedness Judgement:
There is unquestionably a high level of flexibility built into the structures that are available for schools delivering the MYP curriculum. For example, *MYP: FPIP* explains in sections such as "Concurrency and subject-group flexibility" how the curriculum is developed around a number of subject-group requirements but that there is significant flexibility within that broader framework. [277] Beyond this general flexibility, there is also evidence that flexibility enables learning to be tailored to students' interests, to react to research developments, and to reflect on best practice. Because there is evidence that flexibility in the curriculum allows for all three of these areas specified in EoPP 7, the embeddedness judgement is High.

The personal project is one part of the MYP which is unquestionably tailored to student interests and around which there is a great deal of curriculum flexibility. This is described at length in *MYP: Projects Guide* and an overview is given in *MYP: FPIP* where it is stated that:

> "the project offers many opportunities for differentiation of learning and expression according to students' individual needs. The personal nature of the project is important; the project should revolve around a challenge that motivates and interests the individual student. Each student develops a personal project independently". [278]

---

[275] *PYP: FPIP – The Learning*, p. 7.
[276] *PYP: FPIP – The Learning Community*, pp. 20, 25.
[277] *MYP: FPIP*, pp. 40-41.
[278] *MYP: FPIP*, p. 6.

Moreover, it is not only the personal project where teaching is flexibly tailored to student interests. As *MYP: Individuals and Societies Guide* explains, "level of student interest" is a key factor in the judgement of what is an appropriate research question for student inquiries.[279]

There is also evidence that curriculum flexibility enables teachers to adjust their approaches and content in response to new research and in a reflective engagement with best practice. *MYP: FPIP* suggests that "staff reflection on MYP units and unit planning" should be ensured by MYP coordinators.[280] Elsewhere in the same document it is also explained that teachers should be supported to develop their teaching strategies in relation to the IB's curriculum components, such as the ATL skills.[281] All of this suggests that teachers will be enabled to reflect on their practice and respond accordingly with new methods or teaching content. The "Building a Quality Curriculum" subsection of *MYP: FPIP* also indicated that both research and reflection are key components of developing good teaching practice in the MYP, while a specific subsection of the FPIP called "Teachers as learners" explains that teachers' professionalism should be trusted to shape units according to what they learn through teaching and through reacting to the "world around them".[282]

DP Embeddedness Judgement:

On curriculum flexibility in the DP, there is a top-level statement found in the *DP: FPIP*: "the DP is flexible enough to accommodate the needs and interests of individual students while maintaining the principle of concurrent learning of a broad and balanced curriculum".[283] There is, therefore, clear recognition of the fact that curriculum flexibility has specific benefits – including accommodation of student interests as mentioned in EoPP 7. Overall, there is evidence in the sources analysed here that each of the key elements of EoPP 7 are embedded in the DP, across a variety of resources, therefore the embeddedness judgement has been finalised at High.

Regarding flexibility to tailor the programme to student interests, some of the best evidence for this comes in the structural make-up of the core. The fact that students, supported by teachers, can choose what to write their Extended Essay about, how to make links between TOK and their subjects, and what activities to pursue in CAS, all suggests that there is substantial opportunity for the content of the DP to be tailored to students interests. For instance, this may not always be explicitly linked to interdisciplinarity, but there is evidence of embeddedness of this EoPP when *DP: TOK Guide* states that " "In TOK, students reflect on the knowledge, beliefs and opinions that they have built up from their years of academic studies and their lives outside the classroom".[284] Even within subjects, this feature of EoPP 7 also features in subject guides. For example, in *DP: Literature and Performance Guide* it is stated that:

> "Teachers should aim to construct a course that is well balanced and cohesive. Such a course should be flexible enough to accommodate students' differing linguistic

[279] *MYP: Individuals and Societies Guide*, p. 57.
[280] *MYP: FPIP*, p. 31.
[281] *MYP: FPIP*, p. 32.
[282] *MYP: FPIP*, pp. 72, 44-45.
[283] *DP: FPIP*, p. 57.
[284] *DP: TOK Guide*, p. 5.

profiles, interests and talents, teachers' goals, interests and areas of expertise, as well as the availability of resources and specific teaching conditions (for example, class size, availability of space suitable for performance)".[285]

It is therefore evident that this aspect of EoPP 7 is highly embedded.

Regarding the existence of flexibility that enables interdisciplinary developments in academia and research to be integrated into the curriculum, there is evidence of this in multiple subject TSMs. For instance, *DP: ESS TSM* gives examples of what content can be covered in each of the units of the course, but there is clearly scope to modify the precise content in order to use new online tools and integrate new research.[286] The same can be said for *DP: Geography TSM*. In a section concerning a unit on "New and emerging possibilities for managing global risks" the content is listed as including:

> "Investigating the success of international civil society organizations in attempting to raise awareness about, and find solutions for, environmental and social risks associated with global interactions, including a detailed example of an environmental organization's actions (such as Greenpeace or World Wildlife Fund) and a detailed example of one social organization's actions (such as Amnesty or War on Want)".[287]

Within this comment it is evident that there is flexibility built in – to the exact organisations in questions, and to the precise nature of the investigation. This would allow the broad idea of the task to remain the same, but details could be altered based on what was related to current and relevant topics.

Regarding curriculum flexibility which enables reflective development of best practice on the part of teachers, this may be enabled by teacher-teacher collaboration, CPD, or time being set aside for reflection. As the DP judgement write-up for EoPPs 16, 17, and 18 demonstrate, the DP facilitates these sorts of development activities to at least a moderate degree. As a result, it is fair to say this is element of EoPP 7 is adequately satisfied alongside the broader evidence of general curriculum flexibility.

CP Embeddedness Judgement:
A large amount of the evidence for High EoPP 7 embeddedness in the DP can be directly carried-over into this judgement for the CP. Regarding flexibility to tailor content to students' interests and needs, the evidence *from DP: Literature and Performance Guide* applies equally to the CP, and this is further supported by the CP core which (in both the Reflective Project and Personal and Professional Skills) is driven by students' interests and personal aims. Regarding the existence of flexibility that enables interdisciplinary developments in academia and research to be integrated into the curriculum, the evidence from *DP: Geography TSM* and *DP: ESS TSM* also apply equally to the CP. The evidence for flexibility to reflectively develop teaching best practice is perhaps not quite as strong in the CP as in the DP (as is evidenced from EoPP 16's judgement being low in the CP compared to moderate in the DP), but there is

---

[285] *DP: Literature and Performance Guide*, p. 13.
[286] *DP: ESS TSM*.
[287] *DP: Geography TSM*.

still sufficient evidence of time being put aside for teacher collaboration (EoPP 18) and school-wide collaborative efforts (EoPP 17) to suggest that the *opportunity* at least for reflective development among teachers is likely to be available.

Overall, this joint DP/CP evidence is further supported by evidence in *CP: FPIP* that schools have the flexibility to, for example, develop links with local further/higher education providers and employers. The fact that flexibility is a priority for the CP programme is highlighted by the fact that in a section describing "Essential qualities of the Career-related programme", the first four points are:

> "The essential qualities of the Career-related Programme are:
> • A balance of breadth and depth of learning.
> • Flexibility of choice, including a mix of basic requirements and school or student preferences.
> • Localization that recognizes locally defined career-related studies, locally defined language development courses and locally defined pathways for students.
> • Partnerships between schools and local universities, colleges and employers". [288]

All of these points contain flexibility in their composition. This underscores the evidence from joint DP/CP resources and further demonstrates that EoPP 7 is embedded in the CP to a High degree.

Extracted Highlights (6.2.7)

- The PYP documentation examined provides strong evidence of flexibility that enables student interests to be pursued, but only moderate evidence of flexibility designed to enable research-driven developments and reflection on practice. For these reasons, the programme showed Moderate embeddedness of EoPP 7.
- MYP evidence from documents such as the *MYP: Projects Guide*, the FPIP, and the *MYP: Individuals and Societies Guide* showed clear evidence of flexibility that facilitates learning to be tailored to students' interests, to react to research developments, and to reflect on best practice – indicating High embeddedness for EoPP 7.
- DP documentation including the *DP: TOK Guide* and various TSMs focus on the concept of flexibility and its benefits in facilitating student interests, curriculum flexibility which enables reflective development of best practice, and flexibility that enables interdisciplinary developments in research. For these reasons, the DP showed High embeddedness of EoPP 7.
- Joint DP/CP resources indicate High embeddedness for EoPP 7. Moreover, CP-specific documentation also shows that flexibility is a priority in the CP, as the programme is driven by students' interests and goals, and focuses on collaboration to develop links with local further/higher education providers and employers.

---

[288] *CP: FPIP*, p. 14.

6.2.8 EoPP 8: To encourage the use of a wide variety of multimodal sources, enabling students to build their own links between disciplines and explore knowledge areas

– Multimodality posits "the notion that learning is not only a linguistic accomplishment, but is also linked to the dynamic interrelationship among the different semiotic modes of meaning, such as the linguistic, the visual, the gestural, the spatial or the audio mode, which individuals can draw on to derive and produce meaning" (Papadopolou and Avgerinou). Providing multimodal sources to students can enable them to develop their own interdisciplinary links in the process of developing understanding through the variety of different semiotic modes.

	EoPP 8: To encourage the use of a wide variety of multimodal sources, enabling students to build their own links between disciplines and explore knowledge areas			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	Moderate	Moderate	Moderate

Cross-Programme Context: N/A.

PYP Embeddedness Judgement:

Multimodality is a relatively niche idea compared to some of the other pedagogic ideas and tools raised in the literature review (i.e. project-based learning and authentic problem-solving). Nonetheless, the PYP makes a considerable number of references to the use of multimodal sources and the development in students of multimodal literacy. As a result of a number of dedicated subsections within documents, practical examples of how multimodality can be used, and scattered references to multimodal literacy, the embeddedness of EoPP 8 has been judged to be High in the PYP.

In relation to the development of linguistic skills in PYP students, *PYP: FPIP – Learning and Teaching* suggests that multimodal literacy is an important skill. In aid of this, the document describes what multimodality is and explains the value of becoming "multiliterate":

> "The term "multiliterate" is used to describe a person who successfully engages with texts that are paper, live, electronic or multimodal—from simple signs to discussions, presentations, art, music and complex interactive digital technologies, in both receptive and productive modes. Multiliteracy recognizes the complexity of engaging with text, and the choices and decisions inherent in understanding and producing text". [289]

This section may not explicitly link multimodality and multiliteracy to interdisciplinarity or transdisciplinarity, but the implications are clear from the references to the different forms of presentations which students could hope to encounter through multimodality.

More explicit linking of multimodality and transdisciplinarity comes in *PYP: FPIP – The Learning Community*. There are many scattered references in this resource, for example the explanation that "PYP libraries are increasingly flexible multimodal spaces" or the definitions

---

[289] *PYP: FPIP – Learning and Teaching*, pp. 95-96.

of both multimodality and multiliteracies in the end-of-document glossary.[290] However, there are also some subsections of the document dedicated entirely to this pedagogic tool. These subsections contain learning examples, for instance, how PYP students might inquire into the issue of how "Changes in the Earth and its atmosphere influence the way people live their lives". The extended description of how such inquiry might be developed and sustained makes clear that the project would cross disciplinary boundaries and the learning example outcomes explicitly state that multimodality is a key part of this inquiry process.[291] Such practical and detailed examples help to tie together many other scattered references and show that the PYP documentation examined here has an overall High embeddedness of EoPP 8.

MYP Embeddedness Judgement:

There are specific MYP documents analysed in this benchmarking which have explicit focus on the use of multimodal sources. However, multimodal sources are not clearly recommended at the top level as a valuable tool for interdisciplinarity in general. As a result of the patchy discussion of multimodality in the MYP, the embeddedness has been judged to fall just short of the threshold for High, resulting in a judgement of Moderate.

The *MYP: Language Acquisition Guide* is the source which features the most sustained and explicit reference to multimodal sources and the relationship with multiliteracies. Indeed, there is a specific section of that guide named "Teaching and learning with multimodal texts".[292] This section effectively links multimodality with the aims of developing multiliteracies, although the link with interdisciplinarity may not be spelled-out.

The *MYP: Language and Literature Guide* also offers definitions of "multiliteracies" and "multimodal" in its end-of-document glossary.[293] However, apart from those definitions, the term "multiliteracies" does not feature elsewhere in the body of the document, and the term "multimodal" only features once – in reference to the fact that libraries should enable students to communicate "in multimodal ways".[294] Given that these terms feature in the glossary for this subject area, and that this area of study naturally lends itself to the use of multimodal sources, there is evident scope for the embedding of explicit discussion of "multimodality" and its benefits earlier in the document. The teacher support material for this subject area does demonstrate, through its detailed examples, how sources of many types could be used in different units and different inquiries.[295] However, this is not framed within an explicit discussion of how multimodality should be used to achieve specific interdisciplinary outcomes. It is possible that stakeholders could stitch-together the information from multiple resources to achieve an outcome such as EoPP 8, but the documentation and resources do not make this straightforward or explicit.

Overall, there are some strong sections in the MYP documentation analysed here which either effectively describe the theory or the practice of multimodality. However, the embeddedness judgement was finalised at Moderate as a result of there being no discussion of this important

---

[290] *PYP: FPIP – The Learning Community*, pp. 43, 66.
[291] *PYP: FPIP – The Learning Community*, pp. 52-54.
[292] *MYP: Language Acquisition Guide*, pp. 12-13.
[293] *MYP: Language and Literature Guide*, p. 58.
[294] *MYP: Language and Literature Guide*, p. 25.
[295] *MYP: Language and Literature TSM*.

element of interdisciplinary teaching and learning in a centralised location (such as the FPIP, or the start of all subject guides), and because its discussion in subject-specific contexts only may lessen its capacity to be used for interdisciplinary benefits.

DP Embeddedness Judgement:

The term "multimodal" hardly appears in any of the DP resources analysed in this audit, however this does not mean that the idea of employing multimodality as a pedagogic approach is entirely absent.

Specific subjects within those analysed in this benchmarking appear to lend themselves to use of multimodal sources in the DP. One notable example would be Literature and Performance, as described in *DP: Literature and Performance Guide*. The overview section of the document notes that by encouraging students to respond to both literature and performance the course can "broaden the perspectives of students through the exploration of texts from differing cultures, periods and genres".[296] Although this statement does not strictly indicate the use of sources which are, in and of themselves, multimodal, it does suggest that students will develop multiliteracy through the course as a whole.

Elsewhere, *DP: Extended Essay Guide* also contains implications of multimodality, or at least the development of multiliteracy, even if it is not explicit. In reference to the development of approaches to learning skills, the guide suggests that "working on a specific area of research and engaging with different sources of information and data, students become exposed to different and new perspectives on issues and topics".[297] As with the Literature and Performance example above, this does not necessarily mean that students undertaking an interdisciplinary Extended Essay will use multimodal sources, but the ability to widen perspectives by accessing and analysing information in different ways has overlaps with multimodality.

Overall, these scattered references in different subject areas accumulate to an embeddedness judgement of Moderate. Some individual subjects make implicit references to multimodal sources (see, for instance, *DP: Language B Guide*'s discussion of using multiple sources for inquiry).[298] However, the fact that this is scattered and often implicit rather than explicit prevents the judgement from reaching High.

CP Embeddedness Judgement:

Some of the evidence for the DP embeddedness judgement of Moderate for EoPP 8 can be directly carried over into this CP judgement due to the fact that it stems from joint DP/CP resources related to subject guides and TSMs. However, the evidence from *DP: Extended Essay* guide does not apply to the CP.

In place of that evidence, though, a similar level of evidence of indirect reference to the manipulation of multimodal sources is evident in the Service Learning element of the CP core.

---

[296] *DP: Literature and Performance Guide*, p. 7.
[297] *DP: Extended Essay Guide*, p. 26.
[298] *DP Language B Guide*, p. 57.

Although the guide for this part of the core was not one of the resources included in this benchmarking, *CP: FPIP* explains how the portfolio component of Service Learning lends itself to the multiliteracies that develop out of students being exposed to multimodal sources.

> "The service learning portfolio can also be used to showcase the students' service learning programme and should be a source of pride for the students. To highlight its significance, students could have the choice of how the service learning portfolio is assembled, what they include and how it is shared. Individual student learning styles will dictate the type of portfolio that they use: digital, online, diary, journal, scrapbook or a blended approach. Students are encouraged to explore the different options available to them". [299]

This exploration of multimodalities may not have specific mention of interdisciplinarity, and may not be phrased exactly in the way that EoPP 8 described multimodality, but there is no doubt that some of the same relevant skills will be used and developed.

Overall, as with the DP, there is no evidence of explicit references to the use of multimodal sources in order to enable interdisciplinary learning, but the scattered references to relevant ideas and approaches results in an embeddedness judgement of Moderate for EoPP 8 in the CP.

Extracted Highlights (6.2.8)

- Documentation examined shows that the PYP makes several references to the use of multimodal sources and the development of students' multimodal literacy through dedicated subsections within documents, practical examples, and scattered references to multimodal literacy. For these reasons, the level of embeddedness for EoPP 8 is High.
- Although there are some strong sections in the MYP documentation examined which effectively describe the theory or the practice of multimodality, the lack of discussion of its importance in relation interdisciplinary learning in a central location suggests Moderate embeddedness for EoPP 8.
- There are elements of the joint DP/CP documentation, as well as DP-and-CP-specific documentation examined, which show that multimodality is one of the tools used in these programmes. However, the scattered and implicit references of multimodality in the different documents indicate only Moderate embeddedness for EoPP 8 in both the DP and CP.

---

[299] *CP: FPIP*, p. 66.

6.2.9 EoPP 9: To show proactive engagement with the key challenges which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning

– Proactively engaging with, and providing mitigation strategies for, some of the most common challenges facing interdisciplinary learning can help to bridge the divide between theory and practice. Challenges may include clashing logics/processes/concepts emerging in interdisciplinary discourse and pseudo-interdisciplinarity being embedded rather than genuine interdisciplinary learning. Suggested mitigation strategies may include CPD, explanation of how deep disciplinary learning can be integrated into interdisciplinarity (for example, through macro and micro concepts), and emphasising the conceptual bridges between disciplines rather than smaller issues such as terminological barriers.

	EoPP 9: To show proactive engagement with the key challenges which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	Moderate	Moderate	Low

Cross-Programme Context:

- The emphasis in *What is an IB Education?* and the IB curriculum components (LP, ATT, ATL) on the fact that the curriculum is both conceptual and balanced could be seen as contributing to the notion that concepts should be used to bridge different parts of the curriculum in a way that does justice to individual disciplinary areas while enabling interdisciplinarity.

PYP Embeddedness Judgement:

The two key challenges to an integrated curriculum highlighted by EoPP 9 are clashing logics/processes/concepts used by different disciplines and pseudo-interdisciplinarity being deployed rather than genuine links which develop effectively across subjects. The PYP's *transdisciplinary* curriculum naturally reduces the risk of these challenges occurring. Rather than interdisciplinarity being constructed out of a disciplinary structure, the PYP starts with a transdisciplinary structure and fits some disciplinary understanding around that integrated framework. As such, the risks of pseudo-interdisciplinarity or clashing disciplinary features are not of outstanding concern.

Moreover, the mitigation strategies described in EoPP 9 also feature within the documentation examined in this benchmarking. CPD, although not enforced as part of the curriculum in an exacting manner, is recommended in multiple parts of the *PYP: FPIP*. As the discussion around EoPP 14 makes clear, there is moderate evidence of how disciplinary understanding is developed as part of the transdisciplinary curriculum; and the conceptual bridges between disciplinary areas are evidently an area of constant focus in the PYP, as the section of *PYP: FPIP – Learning and Teaching* specifically addressing "Concepts" makes clear. [300]

---

[300] *PYP: FPIP – Learning and Teaching*, pp. 48-56.

Overall, the fact that there is at least moderate evidence of all EoPP 9's suggested mitigation strategies, while the transdisciplinarity of the PYP also makes the risks far less likely to occur in the first place, makes the judgement of the PYP's embeddedness of this EoPP High.

MYP Embeddedness Judgement:

EoPP 9 recommends CPD and the intelligent use of conceptual links within and across disciplines in order to pro-actively engage with the some of the likely challenges which face interdisciplinary learning. The judgement for EoPP 14 demonstrates that the MYP actively and extensively engages with how concepts can be used to build links between disciplines, while also being used to develop deep disciplinary knowledge. As such, and in combination with the fact that the MYP's interdisciplinarity clearly takes the specific nature of disciplines into account (see judgement on EoPP 15), it is evident that the conceptual bridges and macro/micro concepts element of EoPP 9 is well satisfied in the MYP. However, as the discussion around EoPP 16 for the MYP makes clear, there is not substantial evidence in these documents of the MYP curriculum insisting upon CPD that specifically builds interdisciplinary knowledge and methods for teaching staff. The embeddedness judgement for EoPP 16 is Low for the MYP. As a result, taking into account the fact that the MYP does display detailed, coherent, and effective explanation of how concepts can be used within and between disciplines, but does not show a high level of detail regarding how CPD will improve and develop interdisciplinary teaching, the overall embeddedness judgement for EoPP 9 in the MYP in Moderate.

DP Embeddedness Judgement:

Some proactive engagement with some of the common challenges to interdisciplinary learning can be found in specific places within the documentation analysed here where interdisciplinarity is discussed in detail. The use of conceptual understandings to build links between subjects and the simultaneous development of deep disciplinary learning along with innovative integration are well embedded in the DP. However, the use of CPD to proactively engage with the challenges to genuine and sustained interdisciplinarity is not something explicitly covered in the documentation analysed here. As a result, the embeddedness judgement for EoPP 9 in the DP has been finalised at Moderate.

The need to develop deep disciplinary knowledge along with innovative interdisciplinary links is recognised in *DP: Extended Essay Guide* – as discussed in EoPP 14 and 15, as well as in parts of other documentation analysed in this benchmarking. Evidence for the sustained embedding of these practices which can help to proactively avoid pseudo-interdisciplinarity was also found in *DP: FPIP* and in the structure of interdisciplinary subjects such as ESS (evidenced through both the subject guide and TSM).

On the other hand – as the judgement write-up for EoPP 16 in the DP discusses at more length – there were implications in a range of documents that CPD for teaching staff may include development of interdisciplinary knowledge or pedagogies; however, there was not explicit prioritisation of interdisciplinarity when CPD was described in these documents. As a result, the documents analysed in this audit cannot be determined to prove that CPD in the DP programme will allow proactive engagement with the potential challenges to effective interdisciplinary teaching and learning.

CP Embeddedness Judgement:

There is some scattered evidence for the embeddedness of EoPP 9 in the CP, but there are also some gaps or areas of only tangential use of mitigation strategies to prevent pseudo-interdisciplinarity or practical problems with the deployment of interdisciplinary learning. Overall, the embeddedness judgement for EoPP 9 in the CP has been finalised as Low, due to the insubstantial evidence of CPD being directly targeted at improving interdisciplinary learning and only moderate evidence that the specific nature of individual disciplines is given substantial attention when interdisciplinarity is taking place.

As discussed at more length in the embeddedness judgement for EoPP 16, although there is some evidence that CPD in the CP *may* contain a focus on improving the standards of interdisciplinary learning, this is not guaranteed by the evidence of the resources explored in this benchmarking such as *CP: FPIP*. The High and Moderate judgements for EoPP 17 and 18 do suggest that a strong focus on collaboration and even a potential communities of practice model evolving *could* lead to effective personal and professional development for teachers which enhances the likelihood of effective interdisciplinarity in the programme. But, the direct or explicit evidence for this component of EoPP 9 is not emphasised in these resources.

There is some evidence of the use of micro and macro-concepts to bridge and integrate disciplines, for instance in the section on "Conceptual understanding" towards the end of *CP: FPIP*.[301] The Moderate embeddedness judgement for EoPP 15 in the CP demonstrates that there is a structure in place for specific disciplines to interact effectively within a broader interdisciplinary structure in the CP. However, there is also scope for this to be articulated more clearly in either the core or FPIP.

---

[301] *CP: FPIP*, p. 75.

Extracted Highlights (6.2.9)

- The PYP's transdisciplinary structure incorporates disciplinary understanding around that integrated framework and reduces the risks of pseudo-interdisciplinarity or clashing disciplinary features by focusing on the conceptual bridges between disciplinary areas. All the above demonstrate the programme's High embeddedness for EoPP 9.
- MYP documentation examined shows that although the programme displays detailed, coherent, and effective explanations of how concepts can be used within and between disciplines, it doesn't provide details on how CPD can improve and develop interdisciplinary teaching. For this reason, the level of embeddedness for EoPP 9 in the MYP is considered Moderate.
- Evidence indicates that the DP embeds the use of conceptual understandings to build links between subjects and develop deep disciplinary learning along with innovative integration. However, there are only implicit references on the use and prioritisation of CPD to proactively engage with the challenges to genuine and sustained interdisciplinarity, and for this reason the DP showed Low embeddedness for EoPP 9.
- Although there is some evidence that CPD in the CP may contain a focus on improving the standards of interdisciplinary learning, there is a lack of explicit and consistent references related to EoPP 9 that specifically outline ways in which CPD can be directly focused on improving interdisciplinary learning, reflecting a Low embeddedness for EoPP 9.

6.2.10 EoPP 10: To develop interdisciplinarity within an age-appropriate structure, with scope for development along the K-12 age continuum –

Promising practice indicates that interdisciplinary learning is an age-appropriate pedagogy throughout the K-12 age spectrum. However, this does not mean that interdisciplinarity is a static phenomenon in K-12; it should evolve with students' abilities and academic needs. Special attention should be given to the use of concepts which are age-appropriate in complexity, and (following primary-level education) students should increasingly be made aware of how they are using disciplinary knowledge in order to develop interdisciplinary understanding. This does not mean than interdisciplinary themes should be phased out for older students.

	EoPP 10: To develop interdisciplinarity within an age-appropriate structure, with scope for development along the K-12 age continuum			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	High	High

Cross-Programme Context:
- *What is an IB Education?* provides a brief overview of the fact that the PYP contains transdisciplinary themes and suggests that these evolve into global contexts in the MYP and then subject groups in the DP/CP. [302] This provides a basic summary of how interdisciplinarity might develop in a continuously age-appropriate way across all programmes.
- The ATT principle "Designed to Remove Barriers to Learning" contains an implication that teaching in all IB Programmes will be age-appropriate as part of a wider consideration of what individual students require to have effective tailored learning experiences.

PYP Embeddedness Judgement:
To a certain degree, EoPP 10 is difficult to judge on a programme-by-programme basis as a result of the fact that each IB programme is aimed at a single, specific age group. This is perhaps the only EoPP that would be easier to judge on the IB-level as a whole, rather than providing a score for each programme. However, there are aspects of EoPP 10 which *can* be considered in a restricted age context. Is the type/level of integration informed by research into what is age-appropriate? Are concepts age-appropriate in complexity? And is there a consideration made as to how students moving into and out of the specific programme will adjust and evolve their understanding and use of integration?

Regarding the extent to which the PYP's transdisciplinarity is contextualised in research that points out its age-appropriate nature, *PYP: FPIP – Learning and Teaching* does address this issue. A subsection of that document answers the question "What is the evidence of the effectiveness of integrated curriculum approaches?" Although that section has to acknowledge that "transdisciplinary learning has no precedent in primary schooling", it does make effective reference to strong evidence on the benefits of integrated curricula at multiple age ranges. [303] Moreover, the logic behind the PYP's transdisciplinary framework is coherently articulated with

---

[302] *What is an IB Education?*, p. 5.
[303] *PYP: FPIP – Learning and Teaching*, p. 22.

reference to important works on the topic and to the aims of a PYP education. Earlier in *Teaching and Learning* it is explained that:

> "It is a fundamental PYP belief that for early and primary years learners, continuous integration and connection of prior and new knowledge and experiences is the most meaningful way to broaden their understandings about the world. When a curriculum approach goes across, between and beyond subjects, and emphasizes participatory and integrated learning, it honours the learners' curiosity, questions and voice, for whom the curriculum is intended (Beane 1995)". [304]

Such comments indicate that the PYP documents examined here do indeed effectively contextualise their choice of integration level and describe it in relation to age-appropriate pedagogies.

Regarding the use of age-appropriate concepts and ensuring that other pedagogic tools are age-appropriate in the context of the transdisciplinary framework, there is evidence of this in the *Learning and Teaching* document. In relation to concepts, it is explained in a section on "Supporting Conceptual Understandings" that "teachers can make broad conceptual statements more specific, age-appropriate and focused by asking 'Why/how does this relationship or principle occur?' and 'What are the implications of these conceptual understandings?'". [305] This, along with the actual examples of concepts used (e.g. "friendship") demonstrates a clear awareness of the need to make concepts age-appropriate and offers guidance on how this should be achieved. Similarly, "the units of inquiry build on previous learning and are age-appropriate", not least because "Teaching teams have the discretion to decide an appropriate starting point and time frame for the length of each unit of inquiry in order to ensure they are age-appropriate and fit for purpose". [306]

Finally, there is also substantial evidence that the PYP documents examined here express the IB's wider aim of developing a coherent integration policy across its programmes, with age-appropriate development from PYP, to MYP, and then DP/CP. In the *Learning and Teaching* document, the subsection "Transdisciplinarity in the PYP framework" includes extensive discussion and figures which demonstrate the integration differences between IB programmes and how these materialise on the curricula. Later in the same document, it is explained that:

> "Even as subject-specific teachers at PYP schools extend their support for students transitioning to interdisciplinary and disciplinary thinking in the next stage of education in the MYP or other programmes, students will be best served by adopting the habits and methods of a disciplinary thinker within the broader transdisciplinary themes". [307]

In this way, the transdisciplinarity of the PYP is framed in such a way that it smooths the transition to subsequent programmes and thereby continues age-appropriate integration.

---

[304] *PYP: FPIP – Learning and Teaching*, p. 3.
[305] *PYP: FPIP – Learning and Teaching*, p. 52.
[306] *PYP: FPIP – Learning and Teaching*, pp. 59, 62.
[307] *PYP: FPIP – Learning and Teaching*, p. 6.

Overall, all three criteria established by EoPP 10 that can be tested in an age-restricted context are well satisfied by the PYP documentation examined here. As a result, the embeddedness judgement for EoPP 10 in the PYP is High.

MYP Embeddedness Judgement:

There are two key documents of those assessed in this benchmarking of the MYP which indicate that there is a High embeddedness of EoPP 10 in this IB programme. Firstly, *MYP: Fostering Interdisciplinary Teaching and Learning* contains substantial discussion of how the levels of integration evolve to continue being age-appropriate across the IB, as well as explaining why interdisciplinarity is age-appropriate for the middle years. Secondly, *MYP: FPIP* contains evidence that the conceptual understanding developed in MYP is developed in such a way as to continually be age-appropriate.

Early in *MYP: Fostering Interdisciplinary Teaching and Learning*, in a section named "Connected curriculum across IB programmes", there is extensive discussion of how the MYP's interdisciplinarity effectively dovetails with the PYP's transdisciplinary curriculum and the development towards more distinction between the disciplines in the DP/CP. This is an intelligent means of articulating the age-appropriateness of the MYP's interdisciplinarity in a wider IB context. Moreover, even earlier in the same document the age-appropriate benefits of interdisciplinary learning for MYP students are made explicit in a simple bullet-point list. Importantly, this document also explains how there is allowance built into the MYP of how it should be made age-appropriate at multiple internal stages. This is an important consideration as the MYP covers a broad age range with significant student development expected across its programme duration. The "Objectives overview for years 1, 3 and 5" achieves this effectively in relation to "disciplinary grounding", "synthesising", "communicating", and "reflecting". [308]

This impressive embeddedness of EoPP 10 in *MYP: Fostering Interdisciplinary Teaching and Learning* is also supported in other documents. For example, in *MYP: FPIP*, the section discussing "Conceptual understanding" clearly shows how the MYP concepts are framed in such a way that they are age-appropriate throughout the learning cycle.

DP Embeddedness Judgement:

EoPP 10 recommends that age-appropriate interdisciplinary learning might be shaped by evolution throughout the K-12 spectrum, use of age-appropriate concepts, and increasing attention to students' need to be aware of how they are using disciplines and interdisciplinarity. In all three components of EoPP 10, the DP evidence analysed in this benchmarking shows strong embeddedness. As a result, the judgement as been finalised at High.

The age-appropriateness of the DP is framed in multiple places within documentation as part of the developing spectrum of interdisciplinarity from PYP onwards. For instance, in *DP: Environmental Systems and Societies Guide* it is explained how MYP Individuals and Societies and Science provide a jointly valuable interdisciplinary foundation for interdisciplinarity in ESS. "The overlap between some key concepts in these two subject

---

[308] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 15.

groups in MYP reinforces the position of ESS as an interdisciplinary subject in the Diploma Programme, making the MYP a good foundation for ESS".[309] *DP: FPIP* also provides an overview of how the transdisciplinarity evolves through the MYP towards an increasing disciplinary focus in the DP.[310]

The age-appropriateness of concepts in the DP is evidenced across multiple documents. In *DP: FPIP*, the "conceptual understanding" dedicated section discusses the issue of progressing with increasingly complex concepts in order to develop skills and content knowledge.[311] Moreover, in specific subject guides the explanation that accompanies the choices of concepts and how they should be applied in teaching and assessment make clear that the development of age-appropriate complexity is a guiding factor. This can be seen, for instance, in *DP: Mathematics Applications and Interpretation Guide*.[312]

Furthermore, it is evident that the interdisciplinarity deployed in the DP involves an increasing appreciation on the part of the student for how interdisciplinarity and disciplinary knowledge are being combined. This is made most clear in *DP: Extended Essay Guide*, where it is stated that:

> "Students are required to
> • identify an issue of global importance
> • identify a local manifestation of the issue of global importance
> • develop a clear rationale for taking an interdisciplinary approach and use the conceptual framework and vocabulary of two Diploma Programme subjects".[313]

This metacognitive understanding of the place of disciplines and interdisciplinarity is discussed further in EoPP 14 and 15.

CP Embeddedness Judgement:
There are three key markers of age-appropriate interdisciplinary learning highlighted by EoPP 10: progression throughout the K-12 continuum; use of concepts which are age-appropriate in complexity; and increasing attention to how disciplinary knowledge is used to develop interdisciplinary understanding. The evidence for progression highlighted in the DP embeddedness judgement can be carried-over to this CP judgement as it stems from a combination of joint DP/CP resources and from the section on conceptual understanding in *DP: FPIP* which has a direct corollary in *CP: FPIP*.[314] The same can be said for the use of age-appropriate concepts. The only component of the DP embeddedness judgement for EoPP 10 which cannot be directly carried-over to this CP judgement is attention to how disciplinary knowledge is used to develop interdisciplinary understanding (as the DP evidence for this largely stemmed from *DP: Extended Essay Guide*). As such, for the CP to achieve the same high embeddedness judgement as the DP, it requires further evidence of this aspect of the EoPP.

---

[309] *DP: ESS Guide*, p. 4.
[310] *DP: FPIP*, pp. 15-16.
[311] *DP: FPIP*, pp. 71-72.
[312] For example, *DP: Mathematics Applications and Interpretation Guide*, p. 26.
[313] *DP: Extended Essay Guide*, p. 365.
[314] *CP: FPIP*, pp. 73-75.

There is indeed further evidence of this in DP/CP subject resources. For example, *DP: Language B Guide* (which is also a CP document) contains a subsection on conceptual understanding which explains how the subject is designed to "allow students to develop both disciplinary and interdisciplinary understandings".[315] Elsewhere, *DP: ESS TSM* contains a section of that html resource which discusses "Linking questions" that "provide an opportunity for students to reflect on the interconnections between the different ESS topics or other DP subjects, and to gain deeper understanding of the holistic nature of the ESS course and its underlying concepts".[316] It is clear from the list of provided questions that this programme (for 16-19 year-olds) contains an expectation that interdisciplinary work will be metacognitively linked to how it relates to individual disciplines and subject areas.

Overall, the evidence of joint DP/CP resources analysed here demonstrates that all three components of EoPP 10 are satisfied in the CP, making the embeddedness judgement High.

Extracted Highlights (6.2.10)

- PYP documents examined make explicit references to the benefits of integrated curricula at multiple age ranges while describing age-appropriate pedagogies and the use of age-appropriate concepts in the context of the transdisciplinary framework. PYP documents also include explicit statements on the transition to MYP, DP, and CP. For this reason, the PYP level of embeddedness for EoPP 10 is High.
- MYP documentation includes discussions on how the levels of integration evolve to continue being age-appropriate across the IB, articulating the age-appropriateness of the MYP's interdisciplinarity in a wider IB context. This suggests High embeddedness for EoPP 10.
- Joint DP/CP documentation as well as DP- and CP-specific evidence show High embeddedness of EoPP 10. Both programmes include explicit references around age-appropriate interdisciplinary learning and its evolution, the use of concepts which are age-appropriate in complexity, and the ways in which students can deploy interdisciplinarity by reflecting on the interconnections between disciplines to develop disciplinary and interdisciplinary understanding.

---

[315] *DP: Language B Guide*, p. 23.
[316] *DP: ESS TSM*.

6.2.11 EoPP 11: To explain the link between interdisciplinarity and key skills and competences including communication, critical thinking, synthesis, and metacognitive awareness of perspectives – It is possible to view interdisciplinary thinking as a skill/competence in its own right, or as something requiring certain skills, or as a phenomenon giving rise to other desirable skills. It is not essential to define interdisciplinary learning's exact place within the process of skill/competence development, but it should be explained that specific core skills/competences are linked to interdisciplinary learning and should be developed/used alongside interdisciplinarity.

	EoPP 11: To explain the link between interdisciplinarity and key skills and competences including communication, critical thinking, synthesis, and metacognitive awareness of perspectives			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	High	High

Cross-Programme Context:
- See section 4.2 (above) for a detailed exploration of how interdisciplinary learning links to the IB curriculum components (LP, ATT, ATL), including the Approaches to Learning skills (which contains "Thinking Skills") and the Learner Profile attributes (including "Reflective" and "Open Minded").

PYP Embeddedness Judgement:
The cross-programme context demonstrates already that the IB as a whole builds substantial links between subject integration and key skills and competences, as these links are written into the structure of curriculum components such as the LP, ATT, and ATL. However, an *explanation* of these links (as written into EoPP 11) is not provided in those curriculum components themselves. The PYP resources analysed here do deliver that explanation of the links between, in this case, transdisciplinarity and key skills and competences such as communication, critical thinking, synthesis, and metacognitive awareness of perspectives.

In *PYP: FPIP – Overview*, it is explained that "the approaches to learning and approaches to teaching articulated in *What is an IB Education?* play a crucial role in the inquiries into the six transdisciplinary themes". Specifically, that paragraph links the relationship between transdisciplinary learning and the IB curriculum components to the ability to "communicate", "promoting understandings about human commonalities of local, national and global significance", and developing "skills to actively connect prior and new experiences to broaden their understandings about the world".[317] In just one place, this covers a large proportion of the skills and competences described in EoPP 11.

Elsewhere, in *PYP: FPIP – The Learner*, individual skills such as critical thinking and metacognition are individually broken-down in tables and analysed against how pupils might develop them in the PYP. Throughout such descriptions there are both implicit and explicit links drawn between the skills in question and the transdisciplinarity of the curriculum.[318] This

---

[317] *PYP: FPIP – Overview,* p. 4.
[318] *PYP: FPIP – The Learner*, pp. 15-19.

level of detail is not isolated to these tables, however. Earlier in the same document it is clearly stated that:

> "the transdisciplinary themes offer authentic contexts for students to learn increasingly complex ideas about themselves and the world around them. Central ideas related to 'Who we are' support young children to learn about identity, relationships, well-being and what it means to be part of a community. 'How we express ourselves' relates to discovery, creativity and the expression of ideas and feelings". [319]

Within these descriptions are explicit links between the transdisciplinary themes which structure the PYP and the skills and competences such as metacognitive awareness of perspectives which are described by EoPP 11. As a result, the embeddedness judgement for EoPP 11 in the PYP is High.

MYP Embeddedness Judgement:
There is evidence that all four of the skills/competences described in EoPP 11 are linked to interdisciplinary learning in the MYP documents and resources analysed in this benchmarking. As a result of this – and in combination with the cross-programme context which provides a strong foundation through the interrelation of ATL skills with the interdisciplinary elements in the IB's curriculum components – the embeddedness judgement of EoPP 11 in the MYP is High.

"Communicating" is one of the four key objectives set down for interdisciplinary learning in MYP students. As *MYP: Fostering Interdisciplinary Teaching and Learning* makes clear:

> "Interdisciplinary learning helps to prepare students for communicating understandings across areas of expertise. By selecting, integrating or innovating communication forms and strategies, students describe and explain the results of their inquiries. Students develop the capacity to communicate effectively and responsibly with a range of audiences". [320]

Elsewhere, for instance at the start of the *MYP: Mathematics Guide*, communication skills are linked to the fact that the MYP seeks to engage students in cross-subject inquiries. That particular guide states that:

> "the MYP emphasizes intellectual challenge, encouraging students to make connections between their studies in traditional subjects and the real world. It fosters the development of skills for communication, intercultural understanding and global engagement—essential qualities for young people who are becoming global leaders". [321]

Communication skills are referenced throughout the resources examined in this benchmarking of MYP documentation.

---

[319] *PYP: FPIP – The Learner*, p. 6.
[320] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 13.
[321] *MYP: Mathematics Guide*, p. 2.

Thinking critically is one of the key assessment criteria for Individuals and Societies in the MYP.[322] It is also embedded into other subjects too, for instance in *MYP: Language Acquisition Guide* it is explained that:

> "The acquisition of the language of a community and the possibilities to reflect upon and explore cultural perspectives of our own and other communities: are valued as central to developing critical thinking, and are considered essential for the cultivation of intercultural awareness and the development of internationally-minded and responsible members of local, national and global communities".[323]

This statement links critical thinking with other key elements of interdisciplinary learning such as intercultural awareness. Along with the cross-programme context – which is supported in the MYP by further details in the FPIP (including an entire page dedicated to "Critical-thinking skills", which lists components such as "analyse complex concepts and projects into their constituent parts and synthesize them to create new understanding"), these references accumulate to significant overall attention to the links between interdisciplinarity and critical thinking.[324]

The role of synthesis in relation to the MYP's interdisciplinary learning is perhaps made most evident by its role in the structure of interdisciplinary e-assessment. *MYP: Fostering Interdisciplinary Teaching and Learning* makes clear that 40 of the 80 marks available in this e-assessment are awarded for "synthesis and communication of interdisciplinary understanding".[325] Thus, along with communication, this places a heavy emphasis on the fact that effective interdisciplinary learning in the MYP should place the skill of synthesis at its core. Moreover, "Synthesizing" is one of the key objectives for interdisciplinary learning as set-out in its four-part objective structure. Under the title "synthesizing", *MYP: Fostering Interdisciplinary Teaching and Learning* describes how:

> "Through the development of holistic learning students will integrate knowledge from more than one discipline in ways that inform inquiry into relevant ideas, issues and challenges. Students demonstrate the integration of factual, conceptual and procedural knowledge from more than one discipline in order to explain phenomena or create products".[326]

Indeed, "synthesize" is identified as one of the key command terms for the MYP, and the process of synthesis is explicitly described in the majority of MYP documents examined in this benchmarking.[327]

Metacognitive awareness of perspectives is addressed in the *MYP: FPIP*. When describing the overall aims and approaches of the programme, it is stated that:

---

[322] For example, *MYP: Individuals and Societies Guide*, p. 40.
[323] *MYP: Language Acquisition Guide*, p. 4.
[324] *MYP: FPIP*, p. 113.
[325] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 64.
[326] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 12.
[327] *MYP: FPIP*, p. 120.

"Students encounter many subjects simultaneously, approaching concepts from a variety of perspectives throughout their programmes of study; they learn to draw connections and pursue rich understandings about the interrelationship of knowledge and experience across many fields. Course aims and programme requirements offer authentic opportunities to learn about the world in ways that can reach beyond the scope of individual subjects through interdisciplinary learning". [328]

This view of a connected curriculum that allows students to view things from multiple perspectives is vital to building metacognitive awareness of one's own perspective. This is explained most explicitly in a section of *MYP: FPIP* named "Planning for interdisciplinary learning", where it is suggested that "The complexity of real life requires interdisciplinary perspectives that can help students to: address biases and consider diverse interpretations and points of view". [329]

Overall, all four key strands of EoPP 11 have been shown to have explicit discussion in either scattered references throughout documentation, strategic places in key documentation, or both. As a result, the embeddedness judgement for EoPP 11 in the MYP is High.

DP Embeddedness Judgement:
The cross-programme context already demonstrates some of the links suggested by EoPP 11. However, the DP resources analysed here also show widespread links between interdisciplinarity (sometimes implicit and sometimes explicit) and communication, synthesis, critical thinking, and metacognitive awareness of perspectives. As a result, the embeddedness judgement for EoPP 11 in the DP is High.

Regarding the skill or competence of communication, this is discussed in many places in the audited documentation, but one example is in the context of doing an interdisciplinary world-studies Extended Essay. Students are expected to "develop research and communication skills—including the ability to communicate with readers who have a background in more than one subject or discipline". [330] This is a short but effective summary of the interaction between interdisciplinarity and communication skills.

Regarding critical thinking skills, the TOK element of the DP core has particular relevance to the relationship between interdisciplinarity and this competence area. In fact, the *DP: CAS Guide* describes this most effectively, suggesting that the transferable skills that can operate between multiple subjects and the core "might include, for example: • transferring the critical-thinking process developed in TOK to the study of academic disciplines". [331] Elsewhere, specific subjects also describe critical thinking at length, and suggest that it has interdisciplinary benefits. For example, the *DP: Mathematics Applications and Interpretation TSM* explains that

---

[328] *MYP: FPIP*, p. 13.
[329] *MYP: FPIP*, p. 47.
[330] *DP: Extended Essay Guide*, p. 365.
[331] *DP: CAS Guide*, p. 4.

"Thinking skills, and particularly critical thinking, are developed and practised continuously in mathematics; students are challenged to apply their knowledge and skills to unfamiliar contexts or to abstract problems. Thinking skills are further developed through the emphasis in the teaching on conceptual understanding and making the links between different topics". [332]

Synthesis skills are also explicitly linked to interdisciplinarity in the context of the DP core. *DP: FPIP* describes how:

"The DP also provides students with the possibility of undertaking a world studies extended essay that invites students to conduct an in-depth, interdisciplinary investigation into an issue of contemporary global importance. Through the selection of complex global issues, students are required to bring aspects of different disciplines together and synthesize them to advance understanding". [333]

This synthesis skill is also described at more length in the judgements of EoPPs 14 and 15, but it is clearly a key part of the DP's interdisciplinarity that builds on the combination of multiple disciplinary knowledge foundations.

Finally, metacognitive awareness of perspectives is also highly evidenced by parts of the DP core. As *DP: CAS Guide* explains, "CAS continues to develop students' ability to engage in critical reflection, offering increasingly sophisticated opportunities for students to analyse their own thinking, effort and performance". [334] Indeed, this guide ties all of EoPP 11's skills and competences into one place in a further statement about reflection:

"Having established an effective understanding of the four elements of reflection, students develop higher-order thinking skills by critically examining thoughts, feelings and actions, thereby synthesizing their learning. The theory of knowledge (TOK) course provides students with critical thinking skills to develop and extend their reflections". [335]

CP Embeddedness Judgement:
The cross-programme context and joint DP/CP documentation described in the DP embeddedness judgement (for example, evidence from *DP: Mathematics Applications and Interpretation*) all indicate embeddedness of EoPP 11 in the CP. The further evidence of references to multiple aspects of EoPP 11 in the CP core confirm that the embeddedness judgement for this promising practice in the CP is High.

The Personal and Professional Skills component of the CP core demonstrates links (in what is likely to be an interdisciplinary context) to many of the skills and competences described by EoPP 11. For example, *CP: FPIP* describes the thematic structure of this part of the core:

---

[332] *DP: Mathematics Applications and Interpretation TSM.*
[333] *DP: FPIP*, p. 61.
[334] *DP: CAS Guide*, p. 7.
[335] *DP: CAS Guide*, p. 27.

"There are five themes in the personal and professional skills course:
1. Personal development.
2. Intercultural understanding.
3. Effective communication.
4. Thinking processes.
5. Applied ethics". [336]

"Effective communication" and "thinking processes" have direct ties to EoPP 11's descriptions of communication skills and critical thinking, while "intercultural understanding" (due to the fact this involves working comfortably between different contexts) may have links to interdisciplinary learning. Further information and context for the Personal and Professional Skills course is found in *CP: Personal and Professional Skills Guide*, where it is explained that:

"The personal and professional skills course has been designed to complement the approaches to teaching and approaches to learning that students will encounter in their DP courses. Both place a great deal of importance on developing skills such as thinking skills and communication skills; however, in the personal and professional skills course the emphasis is explicitly on skills development for the workplace because these skills are transferable and can be applied in a range of situations". [337]

This is an effective description of how specific skills and competences (such as critical thinking and communication) are developed in the CP with the specific aim of them being transferable. As such, although interdisciplinarity is not explicitly discussed, the structure of skill/competence development nonetheless reflects the intentions of EoPP 11.

The links between communication and interdisciplinarity are further explained in the *Personal and Professional Skills Guide* in detailed deconstructions of the five themes:

"Effective communication
A dynamic, interconnected and complex world requires students to be capable communicators. In the IB learner profile, students strive to be confident and creative communicators, and to work effectively in collaboration with others.
• This theme explores a variety of skills and literacies to broaden students' capabilities as communicators in personal and professional situations and contexts". [338]

A similar deconstruction for thinking processes indicates the likely role that interdisciplinarity may play (albeit implicitly) in this key theme, while linking to critical thinking:

"Thinking processes
It is essential that students develop and utilize thinking skills for current and future success. In the IB learner profile, students strive to use critical and creative thinking skills to analyse complex problems and take responsible action.

---

[336] *CP: FPIP*, p. 51.
[337] *CP: Personal and Professional Skills Guide*, p. 11.
[338] *CP: Personal and Professional Skills Guide*, p. 13.

• This theme provides the opportunity for students to explore and apply a variety of thinking processes to a range of personal and professional situations and contexts". [339]

This description explains the link between critical thinking and the transfer of key skills across multiple contexts. Once again, although interdisciplinarity may not be directly referenced, a similar conceptual structure is clearly at play.

Regarding the synthesis skills described in EoPP 11, this can be seen as part of the wider critical thinking umbrella in Personal and Professional Skills. The guide for that element of the core suggests that the course will explore "how do analysis and synthesis enable us to develop our understanding?". [340] Elsewhere, in the *DP: Literature and Performance Guide*, the role of synthesis is explained at the level of interdisciplinary subject areas.

> "This course is an interdisciplinary synthesis of language A and theatre. It incorporates essential elements of literature and performance and aims to explore the dynamic relationship between the two. At the heart of the course is this interaction between (i) a conventional literary emphasis on close reading, critical writing and discussion and (ii) the practical, aesthetic and symbolic elements of performance". [341]

Finally, metacognitive awareness of perspectives can be found not only in the cross-programme context of curriculum components such as the Learner Profile, but also in the CP core when, for instance, *CP: FPIP* explains that:

> "The personal and professional skills course aims to develop responsibility, practical problem-solving, good intellectual habits, ethical understandings, perseverance, resilience, an appreciation of identity and perspective, and an understanding of the complexity of the modern world. Emphasis is on the development of skills needed to successfully navigate higher education, the workplace and society". [342]

This is just one example, but it demonstrates how awareness of perspectives (including the students' own perspectives) would be incorporated into wider skill and competence development that goes beyond the boundaries of any single subject area.

---

[339] *CP: Personal and Professional Skills Guide*, p. 13.
[340] *CP: Personal and Professional Skills Guide*, p. 43.
[341] *DP: Literature and Performance Guide*, p. 5.
[342] *CP: FPIP*, p. 9.

- The cross-programme documentation, supported by programme-specific documents, clearly indicates that the IB establishes substantial links between subject integration and key skills and competences, as these links are written into the structure of curriculum components such as the LP, ATT, and ATL.

- PYP resources assessed in this analysis provide explicit references and explanations of the links between transdisciplinarity and key skills and competences such as communication, critical thinking, synthesis, and metacognitive awareness of perspectives – suggesting High embeddedness for EoPP 11.

- The roles of communication, critical thinking, synthesis, and metacognitive awareness of perspectives in interdisciplinary learning are explicitly discussed in MYP documentation, through both scattered references and discussion in strategic places in key documentation. This indicates High embeddedness for EoPP 11.

- Cross-programme documents and joint DP/CP documentation indicate High embeddedness of EoPP 11 in both programmes. This is because DP-specific documents incorporate elements such as synthesis and analysis at the level of interdisciplinary subject areas. CP-specific documents (such as *Personal and Professional Skills Guide* and the FPIP) also strengthen this judgement as they include explicit references to metacognitive awareness of perspectives and details on personal development, intercultural understanding, effective communication, thinking processes, and applied ethics.

6.2.12 EoPP 12: To take interdisciplinary learning into account in the design of assessment – Assessment should form a key part of how interdisciplinarity is integrated into the curriculum. Moreover, the nature of that assessment should reflect the key aims and processes underpinning the exact nature of interdisciplinarity described to students within curricula resources.

	EoPP 12: To take interdisciplinary learning into account in the design of assessment			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	Moderate	Low

Cross-Programme Context: N/A.

PYP Embeddedness Judgement:

In relation to assessment, the key part of the PYP documentation audited in this benchmarking tool is the 18-page section of *PYP: FPIP – Learning and Teaching* titled "Assessment". This section gives a broad view of what assessment looks like in the PYP, including big questions such as "what to assess" and "how to assess". Given that the *Learning and Teaching* document contains a significant degree of focus on transdisciplinarity in many parts, it comes as a surprise that the explicit language of transdisciplinarity does not feature to an equally high degree in the assessment section of the resource. There are some sentences where the reader can undoubtedly infer that assessment should take transdisciplinarity into account, but there is also evident scope to amend the sudden reduction in the language of transdisciplinarity at this stage of the document. Overall, embeddedness of EoPP 12 was still judged to be High, as a result of a small selection of clearly-articulated sections. Nonetheless, the word "transdisciplinary" could certainly feature more prominently in the *PYP: FPIP*'s discussion of assessment.

The most prominent statements linking PYP assessment to transdisciplinarity come in the *Learning and Teaching* subsection "What to Assess?". The document states that "PYP assessment recognizes the importance of monitoring and documenting the process of inquiry. Through careful observation of the inquiry process, teachers monitor students' ability to make connections across subjects and to apply skills to construct new knowledge". Later in the same subsection it is also stated that PYP teachers should consider "students' awareness that authentic challenges require solutions based on the integration of knowledge that spans and connects different subjects".[343] Because such statements clearly indicate the prioritisation of subject integration in PYP assessment, the embeddedness judgement for EoPP 12 is High.

MYP Embeddedness Judgement:

The *MYP: FPIP* includes a definition in its glossary which is highly relevant to EoPP 12:

> "Interdisciplinary Assessment: Combining or involving two or more branches of learning or fields of academic study within a single assessment. In the MYP, interdisciplinary study can be developed both within and between/among subject

---

[343] *PYP: FPIP – Learning and Teaching*, p. 74.

groups. MYP external interdisciplinary assessment always involves multiple subject groups". [344]

The fact that this concept qualifies for a definition in the glossary suggests that interdisciplinarity is an important feature of assessment in the MYP. As stated on page 126 of *MYP: FPIP*, students must complete the interdisciplinary examination in order to gain the MYP certificate. [345]

As would be expected (given the extensive discussion of interdisciplinarity in these resources), *MYP: Fostering Interdisciplinary Teaching and Learning*, as well as the corresponding TSM, also contain extensive and explicit explanation of how assessment for this area of the curriculum takes interdisciplinary learning into account. As a result of the fact that interdisciplinary learning is a vital component of the MYP curriculum, and due to the explicit discussion of interdisciplinary assessment in these resources and the FPIP, the embeddedness judgement for EoPP 12 in the MYP is High.

However, this does not mean that there is no scope for further embedding of this principle in the programme. A handful of pages in *MYP: Individuals and Societies Guide* make for an interesting case in point. This document explains that the curriculum flexibility in the MYP enables the seemingly interdisciplinary subject group to be delivered as distinct disciplinary modules if required by local conditions. [346] This, along with the fact that the guide itself and the corresponding TSM do not explicitly discuss interdisciplinary assessment creates a picture of interdisciplinary assessment being potentially extracted as a single component of the curriculum, rather than something that suffuses multiple subject areas.

EoPP 12 does not insist that interdisciplinarity must be present in *all* areas of assessment, hence the embeddedness judgement remains High. However, there is further scope for subject-area documents to put forward the potential avenues for interdisciplinarity to be considered in assessment.

DP Embeddedness Judgement:
Interdisciplinarity does not suffuse all assessment in the DP, instead it is strategically placed in limited parts of the curriculum and not in others. EoPP 12 does not insist that all assessment should be interdisciplinary, only that interdisciplinarity should be taken into account in the design of assessment and that the interdisciplinarity in question should reflect the aims and intentions of integration in the programme. In one part of the core there is evidence that the DP has High embeddedness of EoPP 12, however there is no discussion of interdisciplinary assessment in a top-level, cross-subject document, and the subject-specific assessment criteria provides almost no direct discussion of interdisciplinarity. As a result, the embeddedness judgement has been finalised at Moderate.

The Extended Essay is one key part of the curriculum where assessment clearly takes interdisciplinarity into account, particularly in the interdisciplinary world-studies Extended

---

[344] *MYP: FPIP*, p. 127.
[345] *MYP: FPIP*, p. 126.
[346] *MYP: Individuals and Societies Guide*, pp. 12-14.

Essay. The guide for this part of the core states that assessment criteria include the fact that students should:

"• identify the IB academic disciplines and appropriate key concepts they are going to use
• explain why the research question requires an interdisciplinary approach and indicate the benefits of an integrative approach
• highlight the materials, sources, data and evidence from the two subjects they will be using, with some explanation of why they have been chosen." [347]

Not only does this expectation embed interdisciplinarity into the world-studies Extended Essay assessment, it also emphasises the particular nature of the interdisciplinarity which is emphasised in the DP as a whole – interdisciplinarity that understands how to balance multiple disciplines and use innovative integrated methodologies for additional benefit. This is further set out even more explicitly two pages later:

"Successful interdisciplinary essays require an integrative argument or explanation—that is, the different subjects should be coherently brought together to address the question through, for example:
• a complex causal explanation
• a leading metaphor
• a model
• an analogy.
At the highest level, students should demonstrate:
• effective and nuanced analysis and evaluation of information and findings
• evaluation of the success and limitations of their own integrative approach to the issue." [348]

This shows effective embeddedness of EoPP 12. However, students are not required to take the world-studies form of the Extended Essay. Indeed, if a student were to base their essay on a subject such as philosophy, the same guide would instruct them that "topics must be directly related to philosophy and should not be interdisciplinary in nature". [349] It is therefore clear that some parts of *DP: Extended Essay Guide* show High embeddedness of EoPP 12, but that this does not mean that all students will experience this interdisciplinary assessment in their personalised structure of the DP.

Elsewhere in the DP, the references to interdisciplinarity as part of assessment criteria are far less explicit. Regarding the internal assessment investigation of Environmental Systems and Societies, for example, there is little explicit discussion of interdisciplinarity in the assessment (and also little in the other aspects of assessment in that subject). It is stated, in reference to the investigation part of the course, that "this style of investigation reflects the interdisciplinary nature of the task", however there are no substantial details on how this would impact assessment. [350] Therefore, although the content of the course is clearly interdisciplinary in

---

[347] *DP: Extended Essay Guide*, p. 370.
[348] *DP: Extended Essay Guide*, p. 372.
[349] *DP: Extended Essay Guide*, p. 205.
[350] *DP: ESS Guide*, p. 101.

nature, there is no clear evidence (from the sources examined here) that interdisciplinarity has been taken into account in the design of assessment.

Overall, the DP resources analysed in this benchmarking demonstrate some evidence that EoPP 12 has been taken into account in specific parts of the curriculum, but it is not clear that this is the case for aspects of the DP that all students must sit, and top-level documentation does not suggest that interdisciplinarity has been a driving force for DP assessment in general. As a result, the embeddedness judgement has been capped at Moderate.

CP Embeddedness Judgement:
The most important evidence for the Moderate DP embeddedness of EoPP 12 was found in the *Extended Essay Guide*, with some low-level embeddedness also contributed by *DP: ESS Guide*. Only the latter of those two is a shared DP/CP resource, meaning that CP-specific documentation will need to at least achieve the contribution of the *Extended Essay Guide* if the CP embeddedness judgement is to reach Moderate or High.

In all parts of the CP core, with the exception of the Reflective Project, there is flexibility for schools to develop their own assessment criteria.[351] As a result, explicit links between interdisciplinarity and guaranteed assessment practices are unlikely. There are suggestions that interdisciplinarity (or at least some of the related skills identified in EoPP 11) could be taken into account in assessment, for instance through the Learning Outcomes for Personal and Professional Skills which include:

> "LO 2: demonstrate the ability to apply thinking processes to personal and professional situations
> LO 3: recognize and be able to articulate the value of cultural understanding and appreciation for diversity
> LO 4: demonstrate the skills and recognize the benefits of communicating effectively and working collaboratively".[352]

In taking such learning outcomes into account it is possible that assessment practices would embed interdisciplinarity, but this cannot be said with certainty based on the available evidence from these resources.

In the Reflective Project, the assessment objective most relevant to interdisciplinary learning is AO 3 "Critical Thinking". As part of that AO, the guide states that students should "develop the ability to synthesize information, making connections and linking ideas and evidence".[353] This does not go as far as the *DP: Extended Essay Guide* in directly referencing interdisciplinarity, but it provides a low level of embeddedness of EoPP 12, by implying possible links across disciplines.

Overall, there is some evidence in shared DP/CP subject documentation of embeddedness of EoPP 11, as well as some limited evidence from CP core resources, however these are almost

---

[351] *CP: Personal and Professional Skills Guide*, pp. 27-45.
[352] *CP: Personal and Professional Skills Guide*, p. 9.
[353] *CP: Reflective Project Guide*, p. 28.

entirely only implicitly linked to interdisciplinarity. As a result, the embeddedness judgement for this promising practice in the CP is Low.

<div style="border: 1px solid #800000; padding: 1em;">

Extracted Highlights (6.2.12)

- PYP documentation assessed shows many explicit references and statements linking PYP assessment to transdisciplinarity, clearly indicating the prioritisation of subject integration in PYP assessment. For this reason, the embeddedness judgement for EoPP 12 is considered High.
- The MYP FPIP, which includes a definition of interdisciplinary assessment in the glossary, alongside other MYP documents examined (which include explicit explanation of how assessment takes place in interdisciplinary learning), indicate that interdisciplinarity is an important feature of assessment in the MYP. For this reason, the embeddedness for EoPP 12 was considered High. However, there is further scope for MYP subject-area documents to provide information on interdisciplinary assessment.
- Although there is evidence of embeddedness of EoPP 12 in some DP documentation (such as the *DP: Extended Essay Guide*), there is limited discussion about interdisciplinary assessment in a top-level, cross-subject document, and references to subject-specific assessment criteria. For this reason, this embeddedness judgement for the DP has been finalised as Moderate.
- CP documentation shows that it is possible that CP assessment practices could embed interdisciplinarity (as indicated in the Reflective Project AO3 "Critical Thinking"), but this is not guaranteed. Also, there is some evidence of embeddedness of EoPP 12 in shared DP/CP subject documentation, but these are only implicitly linked to interdisciplinarity. For this reason, the embeddedness of EoPP 12 in the CP is Low.

</div>

6.2.13 EoPP 13: To link interdisciplinary assessment with conceptual understanding, disciplinary grounding, advancement through integration and critical awareness

6.2.13 EoPP 13: To link interdisciplinary assessment with conceptual understanding, disciplinary grounding, advancement through integration and critical awareness – The best exact format through which to carry out assessment of interdisciplinary learning may not have been settled by research, but there are several promising components which are likely to effectively assess the most desirable features of interdisciplinary learning. These are conceptual understanding (potentially linked to authentic contexts), a strong grounding in disciplinary knowledge, demonstration that interdisciplinarity is advancing the aim of the learning in a way that isolated disciplines would not, and critical awareness of how interdisciplinarity is being used and for what purposes.

	EoPP 13: To link interdisciplinary assessment with conceptual understanding, disciplinary grounding, advancement through integration and critical awareness			
Programme:	PYP	MYP	DP	CP
Embeddedness:	Low	High	High	Moderate

Cross-Programme Context:
- Although not explicitly linked to assessment, the relationship between interdisciplinarity and some of the qualities identified in EoPP 13 is established by section 4.2 (above), in which the IB curriculum components (LP, ATT, ATL) are explored for implicit and explicit links to interdisciplinary learning. The takeaway from that analysis is that areas such as conceptual understanding do indeed have links to interdisciplinary learning in the IB's pedagogic philosophy.

PYP Embeddedness Judgement:
There are four key components of EoPP 13. In the PYP's case, high embeddedness of this EoPP would require evidence of transdisciplinary assessment's links to conceptual understanding, disciplinary grounding, advancement through integration, and critical awareness of how transdisciplinarity is being used. Judgement of this EoPP against the PYP is made slightly more complex by the fact that this is a sophisticated combination of learner attributes for students of such a young age – but there is nonetheless evidence that the analysed documents do embed some of these qualities in PYP assessment. Overall, the embeddedness judgement is finalised at Low because while some of EoPP 13's components are satisfied, others are not.

Conceptual understanding is linked to transdisciplinary assessment in *PYP: FPIP – Learning and Teaching*. In the subsection addressing "What to Assess?", it is plainly stated that:

> "Monitoring, documenting and measuring conceptual understandings focus on how concepts are recalled, explained, applied and transferred through a range of learning experiences […] It is, therefore, important that teachers allow for flexibility to monitor and document conceptual understandings over time".[354]

---

[354] *PYP: FPIP – Learning and Teaching*, p. 74.

Disciplinary grounding is less clearly linked to transdisciplinary assessment in the PYP. That is not to say that there is no link between the PYP transdisciplinary curriculum and the idea of subject knowledge. In fact, this link is articulated when *Learning and Teaching* explains:

> "Because transdisciplinarity cannot happen without disciplinarity (Nicolescu 2014), it is necessary that students gain basic understanding and skills in the disciplines to support knowledge integration. A functional command of the appropriate literacies (such as language, mathematics, science and the arts), and the motivation that comes from a level of mastery of those literacies, enable students to feel confident to contribute to collaborative problem-solving. Through subjects, students learn to appreciate the "ways of knowing"—the modes of thought and communication associated with a subject. They develop, for example, understandings of the methodologies associated with thinking like a scientist, a historian or an artist (Gardner and Boix Mansilla 1999)."[355]

Disciplines or subjects, therefore, do feature as part of the transdisciplinary curriculum (see EoPP 14 for more details), however, the discussion of assessment in the PYP does not explain in any detail how subject knowledge interacts with the broader idea of transdisciplinary assessment practices.

Evidence, in the context of assessment, that transdisciplinarity is advancing learning in a way that disciplinarity would not is moderately extant in these PYP resources. For instance, in relation to the assessment of inquiry, *PYP: FPIP – Learning and Teaching* describes how:

> "The criteria for assessment must be known to students at the beginning of the inquiry and should be documented in one of the PYP planners, an adapted planner or the PYP planning process. The criteria accommodate a wide range of knowledge, conceptual understandings and skills. They are revisited and modified during the course of the inquiry, ensuring that they also reflect emergent knowledge, understandings and skills."[356]

Statements such as these show that a process like inquiry (which is a transdisciplinary exercise in the PYP) should be actively improved by ongoing processes of assessment. Explicit description of how transdisciplinarity improves assessment is lacking in these documents, but the benefits are visible if one reads between the lines in statements such as those describing the assessment of student inquiry.

Finally, there is not substantial evidence in these sources that assessment would test PYP students' critical awareness of how they are using transdisciplinarity. Of all of the components of this EoPP, this is perhaps the most sophisticated skill, and is perhaps a high bar to set for a primary years programme. Metacognition does feature in these PYP resources, but this does not stretch to an expectation that assessment will address students' critical awareness of how transdisciplinarity functions.

---

[355] *PYP: FPIP – Learning and Teaching*, p. 12.
[356] *PYP: FPIP – Learning and Teaching*, p. 74.

Overall, the strong evidence of conceptual understanding being linked to transdisciplinary assessment in the PYP, and the moderate evidence of assessment checking that transdisciplinarity is advancing understanding in a way that disciplinary study would not, is counterbalanced by the low levels of evidence for strong disciplinary knowledge being assessed and critical awareness of transdisciplinarity. As a result, the overall embeddedness judgement for EoPP 13 in the PYP is Low.

MYP Embeddedness Judgement:
The overview of the assessment criteria for interdisciplinary assessment in the MYP indicates that some aspects of EoPP 13 are directly referenced. As *MYP: FPIP* makes clear, there are four key assessment criteria: "disciplinary grounding", "synthesizing", "communicating", and "reflecting". Although these do not map directly onto the all aspects of EoPP 13, there is clearly significant overlap. Both the EoPP and the MYP interdisciplinary assessment criteria prioritise "disciplinary grounding"; "advancement through integration" in the EoPP may overlap with "synthesizing" in the MYP; and "critical awareness" in the EoPP may overlap with "reflecting". Overall, from the evidence of these MYP sources analysed in this benchmarking, the embeddedness level of EoPP 13 in the MYP was judged to be High due to all aspects of the EoPP being evidenced through the MYP's interdisciplinary learning assessment criteria.

The details of the MYP's interdisciplinary assessment criteria provide the most effective means of considering the alignment to the different aspects of EoPP 13. Regarding "disciplinary grounding" there is no doubt that the MYP prioritises this in a way that reflects high embeddedness of EoPP 13. The highest marking band for this assessment criteria expects that "the student: demonstrates **extensive necessary** disciplinary grounding". [357]

The examples of assessment in *MYP: Fostering Interdisciplinary Teaching and Learning TSM* do not demonstrate *explicit* engagement with the conceptual understanding aspect of EoPP 13. However, the extent to which the unit plans and subject-group guidance documents focus on conceptual understanding suggest that it is inevitable that this will contribute to assessment. There is scope to add explicit reference to conceptual understanding in relation to interdisciplinary assessment; however, the vital role that concepts play in the MYP's interdisciplinarity nonetheless suggests that conceptual understanding must be taken into account at some level in assessment. [358] This is supported by the more general comments in *MYP: FPIP*, that "the MYP structures sustain inquiry by developing conceptual understanding in global contexts. Each examination series will focus on a specified global context. At least one task on each assessment will be developed in light of this global context". [359] This suggests that some elements of MYP assessment that cross disciplinary boundaries will be structured around conceptual understanding in the first place.

Advancement through integration and critical awareness of how interdisciplinarity is being used are the other aspects of EoPP 13. Advancement through integration is embedded through the interdisciplinary assessment criterion "synthesizing". For the highest marks under this criterion, "the student: • synthesizes disciplinary knowledge to demonstrate consistent,

---

[357] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 53, emphasis in original.
[358] *MYP: Fostering Interdisciplinary Teaching and Learning*, TSM.
[359] *MYP: FPIP*, p. 98.

thorough and insightful interdisciplinary understanding".[360] The reference to "insightful" interdisciplinary understanding is at least an implicit reference to the fact that the integration should provide a novel element not produced within a single discipline. There is scope to make this more explicit.

Critical awareness is also embedded, to some degree, by "synthesizing", but it is embedded more so by the assessment criteria "reflection", which states for the highest mark band that:

> "The student:
> • demonstrates thorough and nuanced reflection on his or her development of interdisciplinary understanding
> • evaluates thoroughly and with sophistication the limitations and benefits of disciplinary and interdisciplinary knowledge and ways of knowing in specific situations".[361]

This statement explicitly requires students to consider how they are using interdisciplinarity, and disciplinary knowledge, thus embedding the EoPP's requirement for "critical awareness".

DP Embeddedness Judgement:
Where interdisciplinarity is taken into account in DP assessment, there is no question that disciplinary grounding, advancement through integration, conceptual understanding, and critical awareness of how interdisciplinarity is being used are key components of that assessment. This is most evident in the *DP: Extended Essay Guide* where the world-studies option is described.

That guide demonstrates the embeddedness of the need for advancement through integration when it states that "students who choose a world studies extended essay must demonstrate how their understanding of an issue of contemporary global significance is enhanced by taking an interdisciplinary approach".[362]

Moreover, the document highlights the role of disciplinary grounding when it explains that:

> "Students are required to
> • identify an issue of global importance
> • identify a local manifestation of the issue of global importance
> • develop a clear rationale for taking an interdisciplinary approach and use the conceptual framework and vocabulary of two Diploma Programme subjects".[363]

Furthermore, as suggested by the last bullet-point of that statement, conceptual understanding is also described as an important element of the Extended Essay project as a whole, and the resulting assessment. Indeed, when discussing the importance of concepts to the course,

---

[360] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 54.
[361] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 56.
[362] *DP: Extended Essay Guide*, p. 36.
[363] *DP: Extended Essay Guide*, p. 365.

there is also clear overlap with the role played by critical awareness of what interdisciplinarity can achieve:

> "In the extended essay, concepts play an important role in helping to frame the focus of the research students are undertaking, and also as a demonstration of their knowledge and understanding. Students who are able to engage critically in discussion about the concepts relevant to their area of research are able to demonstrate at a deeper level how different aspects of their learning are connected". [364]

The Extended Essay thus provides explicit commentary on the importance of all four key elements of EoPP 13 to assessment of this part of the curriculum.

As the discussion of EoPP 12 (above) explains, the part of the DP curriculum which most explicitly discusses interdisciplinary assessment is the world-studies option within the Extended Essay. However, as the embeddedness judgements for EoPP 4, 14, and 15 make clear, the key elements of EoPP 13 are also found in the DP in other places, even if not explicitly linked to assessment. As a result, in combination with the explicit linking to assessment in the *DP: Extended Essay Guide*, the embeddedness judgment for EoPP 13 in the DP is High.

CP Embeddedness Judgement:
As the Low embeddedness judgement for EoPP 12 in the CP demonstrated, assessment is not frequently explicitly linked to interdisciplinarity in the CP. The resources analysed here suggest that interdisciplinarity is most likely to be linked to assessment in interdisciplinary subjects such as ESS or in the Reflective Project. Evidence from these two parts of the curriculum suggests that the four different aspects of EoPP 13 – conceptual understanding, disciplinary grounding, advancement through integration, and critical awareness – are embedded in the CP to a Moderate degree when all considered together.

In ESS, some of the components of EoPP 13 are at least tangentially linked to interdisciplinary assessment. Regarding conceptual understanding, one of the assessment objectives on the course is to "demonstrate knowledge and understanding of relevant: – facts and concepts". [365] Although this is not a detailed link to conceptual understanding, the reference to "concepts" is at least present in an assessment objective (AO). Another AO asks that students:

> "Apply this knowledge and understanding in the analysis of:
> – explanations, concepts and theories
> – data and models
> – case studies in unfamiliar contexts
> – arguments and value systems". [366]

Once again, concepts are mentioned here and the reference to unfamiliar contexts could (though does not necessarily) imply a level of interdisciplinarity.

---

[364] *DP: Extended Essay Guide*, p. 21.
[365] *DP: ESS Guide*, p. 14.
[366] *DP: ESS Guide*, p. 14.

Some level of disciplinary grounding is also implied in ESS documentation in relation to interdisciplinary assessment. The fact that, in the course as a whole, use of ICT and mathematics is expected, suggesting that these disciplines may feature in assessment in some form.[367] Moreover, both disciplinary grounding and advancement through integration are implied in the AO that expects students to:

> "Engage with investigations of environmental and societal issues at the local and global level through:
> – evaluating the political, economic and social contexts of issues
> – selecting and applying the appropriate research and practical skills necessary to carry out investigations
> – suggesting collaborative and innovative solutions that demonstrate awareness and respect for the cultural differences and value systems of others".[368]

This statement highlights individual disciplinary areas such as economics but also implies that innovative solutions should be suggested. Reading this statement in its wider context, it seems likely that students would be rewarded for applying interdisciplinary innovation to the integration of these disciplinary foundations.

Regarding critical awareness of how interdisciplinarity is being used, ESS also has some evidence of this, although the direct links to assessment are not always clear. For example, the internal assessment investigation links these ideas at least tangentially. The guide states that "the purpose of the internal assessment investigation is to focus on a particular aspect of an ESS issue and to apply the results to a broader environmental and/or societal context".[369] Furthermore, "it is intended that this discussion will lead students to develop creative thinking and novel solutions, or to inform current political and management decisions relating to the issue".[370] On the same page of the resource it is also stated that:

> "This style of investigation reflects the interdisciplinary nature of the task. The investigation produced should be commensurate with the level of the course and may draw on methodologies and analytical techniques used in either experimental or human science studies".[371]

Through the combination of these statements there is an implication that students would need to be aware of how different disciplines are being brought together in the investigation. This is not clearly stated in the form of an assessment objective but instead implied across a range of statements about this part of the course.

In the Reflective Project (part of the CP core), the assessment objectives also indicate that some of the components of EoPP 13 may be linked to interdisciplinary assessment. This is not, however, explicitly articulated in terms of interdisciplinarity. The relevant AOs are as follows:

---

[367] *DP: ESS Guide*, p. 17.
[368] *DP: ESS Guide*, p. 14.
[369] *DP: ESS Guide*, p. 100.
[370] *DP: ESS Guide*, p. 101.
[371] *DP: ESS Guide*, p. 101.

"AO1: Focus and method
• select and explore an ethical dilemma embedded in an issue linked to a career-related context
• select and apply appropriate research methods and collect and select relevant information from a variety of sources, showing an understanding of bias and validity.

AO2: Knowledge and understanding in context
• demonstrate knowledge and understanding of the issue
• contextualize the ethical dilemma and analyse different perspectives on it through the use of a local/global example of the issue in which the dilemma is embedded
• demonstrate awareness and understanding of the impact of the ethical dilemma on a local/global community and the cultural influences on, and perceptions of, the ethical dilemma.

AO3: Critical thinking
• demonstrate logical reasoning processes and the ability to interpret, analyse and evaluate material
• develop the ability to synthesize information, making connections and linking ideas and evidence.

AO4: Communication
• present a structured and coherent project, use appropriate terminology accurately and consistently, and communicate ideas and concepts clearly.

AO5: Engagement and reflections on planning and progress
• reflect on and refine the research process, and react to insights gained through exploration of the ethical dilemma
• critique decisions made throughout the research process and suggest improvements to their own working practices".[372]

There are at least tangential links between interdisciplinary assessment and: conceptual understanding in AO4; disciplinary grounding in AO1; advancement through integration in AO5; and critical awareness of interdisciplinarity in AO3 and AO2. In none of these cases is the link explicit or unequivocal, but theses AOs clearly present the possibility at least of some of the aspects of EoPP 13 being assessed in the Reflective Project.

Overall, the evidence from the Reflective Project documentation and ESS documentation both demonstrate Moderate embeddedness of this principle in the CP. In some places there is evidence of discussion of relevant ideas but without clear links to assessment, and in other places there is clearly a link to assessment but interdisciplinarity remains only implicit.

---

[372] *CP: Reflective Project Guide*, p. 28.

- In the PYP, moderate evidence of assessment checking that transdisciplinarity is advancing understanding (in a way that disciplinary study would not) is counterbalanced by the low levels of evidence for strong disciplinary knowledge being assessed and critical awareness of transdisciplinarity. As a result, the overall embeddedness judgement for EoPP 13 in the PYP is Low.

- Evidence from MYP sources examined show High embeddedness for EoPP 13, as the documents include all elements of EoPP 13 such as conceptual understanding, a strong grounding in disciplinary knowledge, demonstration that interdisciplinarity is advancing the aim of learning in a way that isolated disciplines would not, and critical awareness.

- DP documentation examined shows that interdisciplinarity in the DP assessment focusses on disciplinary grounding, advancement through integration, conceptual understanding, and critical awareness of how interdisciplinarity is being used (mostly evident in the *DP: Extended Essay Guide* where the world-studies option is described). For this reason, the level of embeddedness for EoPP 13 is considered High.

- Evidence from CP documentation indicates that assessment is not always explicitly linked to interdisciplinarity in the programme. Interdisciplinarity is most likely to be associated with assessment in subjects such as ESS or in the Reflective Project. In these curriculum components, conceptual understanding, disciplinary grounding, advancement through integration, and critical awareness are embedded in the CP to a Moderate degree, when considered together.

6.2.14 EoPP 14: To encourage interdisciplinarity and individual disciplines to mutually reinforce one-another; with interdisciplinary methods being used to develop deep and innovative disciplinary understanding –

Interdisciplinarity and traditional disciplines should not be viewed as opposites, but should both be part of balanced curricula. There are many possible avenues for blending interdisciplinarity with disciplines, for example, the promotion of new interdisciplines and the use of subject-areas such as STEM.

	EoPP 14: To encourage interdisciplinarity and individual disciplines to mutually reinforce one-another; with interdisciplinary methods being used to develop deep and innovative disciplinary understanding			
Programme:	PYP	MYP	DP	CP
Embeddedness:	Moderate	High	High	High

Cross-Programme Context:

- *What is an IB Education?* gives a general overview of the fact that there are transdisciplinary themes in the PYP, interdisciplinary global contexts in the MYP, and subject-areas (which resemble EoPP 14's recommendations for "interdisciplines") in the DP/CP.

PYP Embeddedness Judgement:

"While the PYP model espouses transdisciplinary learning, it is important to acknowledge that 'the disciplines of knowledge are not the enemy. Instead, they are a useful and necessary ally' (Beane 1995: 616). So, the question is not whether there is a place for subject knowledge, but how to bring knowledge into the transdisciplinary unit in a compelling and authentic way". [373]

This emphatic statement in *PYP: FPIP – Learning and Teaching* encapsulates the fact that individual disciplines are still expected to form a part of the PYP's transdisciplinary curriculum, not least so that students are prepared for the comparative reduction of integration in the MYP and following programmes.

The method of incorporating individual disciplines into the PYP curriculum is through the six subject areas which support transdisciplinary inquiry. These subject areas – language, mathematics, science, social studies, arts, and physical, social and personal education – are tools which enable effective development of knowledge in a transdisciplinary structure. The documentation examined in this benchmarking tool makes clear that further details on how this should function in practice can be found in other resources:

"While the scope and sequence guidance provides a roadmap for subject-specific knowledge, teachers sequence subject knowledge based on its relevance to the theme or central idea under investigation […] Learn more about subject specific guidance in an inquiry. See the PYP scope and sequence". [374]

---

[373] *PYP: FPIP – Learning and Teaching*, p. 12.
[374] *PYP: FPIP – Learning and Teaching*, p. 12.

The scope and sequence document, therefore, contains further details, which would potentially enable a higher integration judgement of this EoPP in the PYP (though it is outside the scope of this benchmarking).

Although more details on how individual disciplines would be used to support transdisciplinary inquiry may be found elsewhere, there are at least some examples within the documentation examined here. For instance, *Learning and Teaching* suggests that as well as a "transdisciplinary unit of inquiry", teaching might also be broken-down into "subject-specific inquiry".

> "Subject-specific inquiry: There are times when teachers will teach subject-specific knowledge (such as language conventions and order of operations in mathematics), conceptual understandings and skills outside the programme of inquiry using purposeful inquiry. The teaching team uses the planning process or planners to structure and plan for this type of inquiry to ensure that authentic connections are made with programme elements while maintaining the integrity of the subject". [375]

Another example of how subjects and transdisciplinarity might be practically delivered in the PYP is found in *PYP: FPIP – The Learning Community*, in which a scenario is described for a co-constructed learning experience:

> "An investigation to develop the conceptual understanding that 'Patterns repeat and grow' in mathematics is co-constructed between the year-level or mathematics specialist teacher and the visual arts and PE specialist teachers. Strong connections are made by applying the mathematics patterns and sequences presented in visual arts and through dance and gymnastics movements". [376]

There are a number of such practical examples scattered throughout the entire *PYP: FPIP*, however, there is scope for a more cohesive section in which all six subject groups and their means of being practically developed within a transdisciplinary framework are explored with examples. This is the sort of information which, if delivered with more detail (as seems likely in other PYP resources) would enable a judgement of High embeddedness for EoPP 14. However, given the more scattered nature of the examples in the documents examined in this benchmarking, the embeddedness judgement for EoPP 14 is Moderate.

MYP Embeddedness Judgement:
The embeddedness of EoPP 14 in the MYP is High as a result of the programme's explanation (in key document areas) that disciplinary grounding is a key aspect of interdisciplinarity. Moreover, the general curriculum structure of the MYP is such that individual subjects are blended with interdisciplinary learning. Although there is flexibility in the curriculum (meaning that the exact nature of the integration can vary depending on local/national circumstances), IB documentation indicates that interdisciplinarity and disciplinary learning will take part in unison for MYP students.

---

[375] *PYP: FPIP – Learning and Teaching*, pp. 64-65.
[376] *PYP: FPIP – The Learning Community*, p. 34.

MYP: FPIP describes MYP interdisciplinarity as functioning through three "key qualities": purposeful, integrative, and grounded in disciplines. [377] This tripartite structure exemplifies EoPP 14's suggestion that interdisciplinarity and disciplinarity should be mutually beneficial forces in the curriculum. Further detail on this function in practice is delivered by *MYP: FPIP*'s description of how concepts are used in the MYP. Early in the document it is stated that:

> "MYP programme design uses two kinds of concepts.
> • Key concepts, contributed from each subject group, provide interdisciplinary breadth to the programme. Key concepts are broad, organizing, powerful ideas that have relevance within and across subjects and disciplines, providing connections that can transfer across time and culture.
> • Related concepts, grounded in specific disciplines, explore key concepts in greater detail, providing depth to the programme. They emerge from reflection on the nature of specific subjects and disciplines, providing a focus for inquiry into subject-specific content". [378]

The concurrent use of "key concepts" and their interdisciplinary breadth, with "related concepts" – grounded in specific disciplines – supplies an effective and clear strategy for practically deploying the "key qualities" of interdisciplinarity described later in the document.

Individual subject-area guides, for example *MYP: Individuals and Societies,* provide lists of the types of key and related concepts which enable interdisciplinarity to blend with disciplinary grounding. [379] Moreover, the corresponding TSMs also show examples of how this would work in practice. [380] This combination of practical examples and theoretical clarity in key document ensures that EoPP 14 has High embeddedness in the MYP.

DP Embeddedness Judgement:
Where the DP employs interdisciplinarity in its curriculum, there is strong evidence that it is linked to the development of deep disciplinary understanding. This is evidenced by explicit comments as well as the overall structure of parts of the curriculum. As a result, the embeddedness judgement for EoPP 14 in the DP is High.

The *DP: Extended Essay Guide* contains advice on how students should develop a research project for the interdisciplinary world studies Extended Essay. As an overview, it is explained that:

> "Students are required to
> • identify an issue of global importance
> • identify a local manifestation of the issue of global importance
> • develop a clear rationale for taking an interdisciplinary approach and use the conceptual framework and vocabulary of two Diploma Programme subjects". [381]

---

[377] *MYP: FPIP*, p. 47.
[378] *MYP: FPIP*, p.15.
[379] *MYP: Individuals and Societies Guide*, pp. 18-22.
[380] *MYP: Individuals and Societies TSM.*
[381] *DP: Extended Essay Guide*, p. 365.

This statement clearly indicates that the interdisciplinary Extended Essay could not be completed without building deep disciplinary understandings within the subjects being integrated and realising how interdisciplinarity builds on disciplinary foundations. Also in the DP core, the examples of "knowledge questions" within TOK are clearly shown by the guide to enable interdisciplinarity while also building on foundations of the how knowledge is developed within disciplines or subjects. [382]

Elsewhere, *DP: FPIP* provides an overview of how interdisciplinarity interacts with disciplines in the programme. It is clearly stated here that "the DP is primarily discipline-based, as the programme is structured around academic disciplines, which provide theoretical and methodological frameworks that students learn to understand and use". [383] This section also states that students should not use disciplines in isolation, without seeking to understand the links and overlaps between them, but the focus is clearly on the fact that disciplinary understanding will be a prerequisite for effective interdisciplinary teaching and learning.

EoPP 14 also suggests that the use of new interdisciplines or combined subject areas might be an effective avenue for promoting disciplinary understanding within an interdisciplinary framework. The DP does indeed offer subjects which might be considered interdisciplines, with examples including Environmental Systems and Societies, Literature and Performance, and Information Technology in a Global Society.

As the judgement write-up for EoPP 15 in the DP makes clear, individual disciplines and their specific methodologies and content are also given close attention in the development of interdisciplinarity in the DP. As a result, the combination of over-arching statements on this topic along with advice specific to parts of the core or individual subjects, results in an embeddedness judgement of High for EoPP 14 in the DP.

CP Embeddedness Judgement:
As is the case in the DP, the CP makes use of the same interdisciplines in its curriculum, with examples including Environmental Systems and Societies, Literature and Performance, and Information Technology in a Global Society. This is one indication that disciplinarity and interdisciplinarity are mutually supportive in the CP. Whereas the DP judgement drew heavily upon evidence from *DP: Extended Essay Guide*, that resource is not shared with the CP, meaning that other documents need to provide evidence of the development of deep disciplinary knowledge being enabled by interdisciplinary methods in the curriculum, if the embeddedness judgement for the CP is to remain at High.

There is some evidence that this is the case in individual subjects such as ESS. In the guide for that document, in relation to the internal assessment investigation, it is stated that:

> "This style of investigation reflects the interdisciplinary nature of the task. The investigation produced should be commensurate with the level of the course and may

---

[382] *DP: TOK Guide*, p. 12.
[383] *DP: FPIP*, p. 57.

draw on methodologies and analytical techniques used in either experimental or human science studies".[384]

The implication of this statement is that students should be able to draw from deep understanding of methodologies within different disciplinary areas (such as experimental science studies) in order to develop an investigation in this interdisciplinary subject. Elsewhere, a similar picture is portrayed by the description of interactions between disciplines and interdisciplinarity in *DP: Literature and Performance Guide*, when it is explained that:

"This course is an interdisciplinary synthesis of language A and theatre. It incorporates essential elements of literature and performance and aims to explore the dynamic relationship between the two. At the heart of the course is this interaction between (i) a conventional literary emphasis on close reading, critical writing and discussion and (ii) the practical, aesthetic and symbolic elements of performance".[385]

Although there is not substantial embeddedness of EoPP 14 in the CP core documents examined in this benchmarking, or in *CP: FPIP*, the guides and TSMs for interdisciplinary subjects confirm that the overall embeddedness of this promising practice is High.

Extracted Highlights (6.2.14)

- Incorporating individual disciplines into the PYP curriculum can be achieved through the six subject areas which support transdisciplinary inquiry. PYP documentation examined includes information and practical examples on how individual disciplines can be used to support transdisciplinary inquiry. However, these are scattered in the documents examined, rather than discussed in a centralised place, and for this reason the embeddedness for EoPP 14 is Moderate.
- The embeddedness of EoPP 14 in the MYP is High, due to both the programme's explanation that disciplinary grounding is a key aspect of interdisciplinarity and the general curriculum structure of the MYP which indicates that individual subjects are blended with interdisciplinary learning.
- In areas where the DP employs interdisciplinarity in its curriculum, there is strong evidence that it is linked to the development of deep disciplinary understanding. This is evidenced by explicit comments and the overall structure of the DP curriculum. Also, the DP offers subjects which can be considered interdisciplines, such as the ESS, Literature and Performance, and Information Technology in a Global Society, suggesting a High embeddedness for EoPP 14.
- Although there is not substantial embeddedness of EoPP 14 in the CP core documents examined, or in *CP: FPIP*, the subject guides and TSMs for interdisciplinary subjects which are joint with the DP, including ESS, Literature and Performance, and Information Technology in a Global Society, suggest a High level of embeddedness for EoPP 14.

---

[384] *DP: ESS Guide*, p. 101.
[385] *DP: Literature and Performance Guide*, p. 5.

6.2.15 EoPP 15: To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual nature of specific disciplines

– As part of using interdisciplinary learning to strengthen disciplinary education, specific attention should be given to how interdisciplinarity interacts with the intrinsic and individual nature of each discipline being integrated. Specific approaches to contextualising, conceptualising, and using different types of problem-solving are examples of the type of guidance which may address the features of individual disciplines.

	EoPP 15: To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual nature of specific disciplines			
Programme:	PYP	MYP	DP	CP
Embeddedness:	Low	High	High	Moderate

Cross-Programme Context: N/A.

PYP Embeddedness Judgement:

As discussed in the context of EoPP 14 (above), there are six subject groups developed within the PYP's transdisciplinary framework. These subject areas are: language, mathematics, science, social studies, arts, and physical, social and personal education. As would perhaps be expected, the transdisciplinary focus of the PYP demonstrates less subject-specific focus compared to a curriculum that labels itself interdisciplinary, multidisciplinary, or disciplinary. There are some examples in the PYP documents examined here regarding how the individual nature of specific subjects could be taken into account in PYP teaching and learning, but the specific qualities of individual subjects are clearly a lower priority in these resources compared to the transdisciplinary framework and its key features such as conceptual understanding and integrated, student-led inquiry.

One place where the specific nature of individual subjects is briefly described is in reference to "related concepts" in *PYP: FPIP – Learning and Teaching*. This subsection describes how key concepts can be explored by breaking them down into smaller related concepts, and these related concepts may be guided by subject-specific content. For instance, "in science, 'adaptation' could be a related concept connected to the key concept of 'change'; in individuals and societies, 'sustainability' could be a related concept associated with 'change and responsibility'."[386] This is one example of how teachers might use the transdisciplinary framework to incorporate the individual nature of specific subjects into their teaching.

This EoPP is another area where the specific structure of the IB (a centralised organisation with World Schools in a vast number of different countries and jurisdictions) makes judgement of embeddedness challenging. There is flexibility built into the IB's structure to enable appropriate approaches to the needs of a school's local context; the relationship between transdisciplinarity and the inherent nature of subjects is one of the areas impacted by this flexibility. The PYP *Scope and Sequence* documents (outside of the reach of this benchmarking) are potentially an important tool here, but, as the FPIP clearly states, those resources only provide guidance rather than mandating particular methods or content.

---

[386] *PYP: FPIP – Learning and Teaching*, pp. 49-50.

"Determining a whole-school vision for learning involves an ongoing process of curriculum mapping. The IB has developed a suite of subject-specific guidance, called PYP scope and sequence documents, for optional use by schools. Language, mathematics, science, social studies, arts, and PSPE are the key subjects of the PYP curriculum. These documents contribute to an understanding of particular subjects. As well as documenting subject-specific content (knowledge and conceptual understandings), each scope and sequence document offers learning continuums for different phases of development.

The content of a school's scope and sequence documents may be partially or wholly mandated by a local, state or national authority, or they may be determined by the school itself. Schools may adopt or adapt the PYP scope and sequence documents if they are in a position to do so. Teachers map the curriculum using these scope and sequence documents inside and outside of their school's programme of inquiry.

Together, the programme of inquiry and scope and sequence documents articulate what the school has agreed are the best possible learning opportunities to achieve the knowledge, conceptual understandings and skills of the subjects as well as the overall learning outcomes of an IB education".[387]

Evidently, this guidance creates the *possibility* of a school's transdisciplinary framework carefully using the specific nature of individual disciplines as a foundation. However, the level of flexibility available and the lack of specific guidance given in the documents examined in this benchmarking necessitate an embeddedness judgement of Low for EoPP 15 in the PYP.

MYP Embeddedness Judgement:
The MYP demonstrates High embeddedness of EoPP 15, as the examples of interdisciplinary units clearly show significant attention to the inherent nature of the different disciplinary areas being combined or put into conversation with one another.

The evidence that interdisciplinary learning in the MYP uses disciplinary grounding as one of its key objectives is already evidence that the specific nature of individual disciplines is likely to be taken into account. This emphasis on disciplinary grounding for interdisciplinary learning is described as an assessment criteria in *MYP: FPIP*, but it is explored in far greater detail in *MYP: Fostering Interdisciplinary Teaching and Learning*.[388] As EoPP 15 recommends, there is also evidence that conceptual understanding for interdisciplinary learning has been framed around the specific natures of individual disciplines. Individual subject guides contribute in this respect. *MYP: Language and Literature Guide*, for example, presents a table of the key concepts used in the MYP and highlights those with particular relevance to the language and literature subject area: "communication, connections, creativity and perspective".[389]

---

[387] *PYP: FPIP – Learning and Teaching*, p. 65.
[388] *MYP: FPIP*, p. 81.
[389] *MYP: Language and Literature Guide*, p. 19.

However, the most important evidence for the fact that the MYP's interdisciplinarity takes the nature of disciplines into close consideration in its design are the example units described at length in *MYP: Fostering Interdisciplinary Teaching Learning TSM*. That html resource contains eight full examples of interdisciplinary units which includes, for each, a unit plan, assessment task, student work-action plan, student work-final proposal, and assessment examples. The unit plans are particularly revealing when it comes to showing that the subject groups used in the interdisciplinary inquiry have the inherent subject natures taken into account. For instance, in "Example 3: Disaster Prevention", the subject groups deployed are Individuals and Societies and Sciences. The unit plan clearly structures different aspects of the inquiry, including different methodologies and outputs in order to reflect that the fact that these subject groups lend themselves to different aspects of the unit and different types of student work.[390]

DP Embeddedness Judgement:

There is evidence across multiple DP documents and resources analysed in this benchmarking that the programme puts the individual and specific nature of disciplines in a foundational place within the interdisciplinary work carried out in the curriculum. As a result, the embeddedness judgement for EoPP 15 in the DP is High.

There are references throughout a number of subject documents and core-component documents that specific disciplinary knowledge should be a key consideration in the development of interdisciplinary understanding. For example, in *DP: Extended Essay Guide* (in relation to the prospect of writing an Extended Essay related to the DP subject Global Politics):

> "Global politics is an interdisciplinary subject, reflecting the complex nature of many contemporary political issues. Nonetheless, it has its own theoretical and conceptual frames, terminology, methods and literature. It is essential for students undertaking an EE in global politics to have knowledge and understanding of these. Global politics is not a residual category for essays that do not fit into any other subject".[391]

This is an effective statement which speaks directly to EoPP 15's concerns for the fact that individual disciplinary areas have their own methods and theories which should not be lost in the shuffle when interdisciplinary project-based learning is deployed.

Later in *DP: Extended Essay Guide*, in relation to the prospect of doing an Extended Essay on the subject of Environmental Systems and Societies, it is suggested that:

> "since the subject is interdisciplinary, the student will need to select and integrate theoretical contexts and methodologies with those academic disciplines appropriate to the chosen topic.

---

[390] *MYP: Fostering Interdisciplinary Teaching and Learning TSM*.
[391] *DP: Extended Essay Guide*, p. 174.

In this respect, a systems approach is particularly effective, and students will be expected to use this approach in the analysis and interpretation of their data".[392]

This is another example where interdisciplinary work is directed towards the appropriate disciplinary foundations for the specific content area – in this case systems methodologies.

Finally, it is also worth considering the content of individual subject guides. For example, *DP: ESS Guide* contains extensive discussion of the relationship between TOK and ESS and demonstrates some links pertinent to EoPP 15.

"TOK lessons can support students in their study of ESS, just as the study of ESS can support students in their TOK studies. TOK provides a space for students to engage in stimulating, wider discussions about questions such as what it means for a discipline to be a natural science or a human science, or whether there should be ethical constraints on the pursuit of this knowledge. It also provides an opportunity for students to reflect on the methodologies of ESS as an interdisciplinary subject, and how these compare to the methodologies of other areas of knowledge. It is now widely accepted that researchers utilize not only scientific methods, but a variety of approaches, in order to enhance understanding of the interaction between environmental systems and societies. Scientific disciplines share a common focus on utilizing inductive and deductive reasoning, on the importance of evidence, and so on; but in the ESS course students are also required to use other methods traditionally associated with the human sciences".[393]

This explanation of the position of TOK from the perspective of an interdisciplinary subject is representative of the important role that can be played by this part of the DP core in relation to seeing the importance of different types of disciplinary knowledge and how they can provide unique opportunities to develop student understanding.

A subject which may traditionally be seen as highly disciplinary in nature (mathematics) also demonstrates content in the relevant subject guide which suggests that the specific nature of that subject and wider links to interdisciplinarity have been carefully considered. The section of *DP: Mathematics Applications and Interpretation Guide* which extensively discusses "The Nature of Mathematics" builds a number of effective links between the subject's specific nature and interdisciplinarity, and the section discussing "Syllabus Content" provides well-flagged examples of how topics within the discipline of mathematics can blend into interdisciplinary learning.

CP Embeddedness Judgement:
From the DP embeddedness judgement for EoPP 15, only some of the evidence can be carried-over to this CP judgement as a substantial amount stemmed from the DP-specific *Extended Essay Guide* and the parts of ESS documentation which relate to TOK (a DP-specific component of the curriculum). In contrast to the Extended Essay and TOK elements of the DP core, the resources examined here which relate to the CP core do not show evidence

---

[392] *DP: Extended Essay Guide*, p. 349.
[393] *DP: ESS Guide*, p. 7.

which supports the embeddedness of EoPP 15 in the programme. Although the Reflective Project does emphasise transferable skills and other competences with links to interdisciplinarity, there is no suggestion in the documentation that the specific nature of individual disciplines will inform approaches to interdisciplinarity. The same can be said for Personal and Professional Skills. There is potential, if a student's area of professional interest directly overlaps with a single discipline (e.g. Dance) that interdisciplinarity which addresses the inherent nature of a discipline *could* ensue from this part of the core, but it is not a clear expectation from documentation.

The programme FPIP also does not provide any explicit evidence of embeddedness of EoPP 15. In the section at the end of the document addressing conceptual understanding, the benefits or a conceptual approach are articulated as helping students:

> "achieve higher levels of critical, creative and conceptual thinking as students analyse complex global challenges, such as climate change, international conflicts and the global economy and create greater subject depth through the study of discipline-specific concepts.
>
> In a concept-based teaching model, teachers use knowledge as a tool to help students grasp transferable concepts and understandings. Knowledge provides the foundation and support for deeper, conceptual thinking".[394]

This combination of "discipline-specific concepts" and "transferable concepts" does imply some level of the attention to the specific nature of individual disciplines within an interdisciplinary framework, but it is not explicitly articulating the content of EoPP 15.

Besides this CP-specific documentation, the remaining evidence for embeddedness of EoPP 15 in the CP can be found in the joint DP/CP resources. Subjects which contain a naturally interdisciplinary structure are the greatest facilitators of EoPP 15 in the CP curriculum, for example ESS and Literature and Performance. The structure of these subjects suggests that the inherent nature of component disciplines will be important to the experience of the integrated overall subject. For instance, *DP: Literature and Performance Guide* states that:

> "This course is an interdisciplinary synthesis of language A and theatre. It incorporates essential elements of literature and performance and aims to explore the dynamic relationship between the two. At the heart of the course is this interaction between (i) a conventional literary emphasis on close reading, critical writing and discussion and (ii) the practical, aesthetic and symbolic elements of performance".[395]

Similarly, the *DP: ESS TSM* explains that:

> "Environmental systems and societies is an interdisciplinary subject that brings together the scientific study of ecological systems with an holistic understanding of human impacts on these systems. It requires students to appreciate the complex interplay of cultural, economic, ethical, political and social aspects of human influence

[394] *CP: FPIP*, p. 75.
[395] *DP: Literature and Performance Guide*, p. 5.

on the environment as well as to understand the methods used in the study of the environment (both in scientific and social contexts). At the heart of the course is the concept of environmental value systems (EVSs) that underpin the ways in which humans respond to environmental issues". [396]

In both of these cases, the overall structure of the subjects reflects an interdisciplinary approach which takes the foundations of multiple disciplines and integrates them. In this process, the inherent nature of individual disciplines (in terms of knowledge content and methodologies/theories) is taken into account.

Outside of these interdisciplines, the subject guide for Mathematics: Applications and Interpretation also shows effective links between "The Nature of Mathematics" and the way that interdisciplinarity could develop around the subject (see discussion in the DP judgement above). Some of the interdisciplinary links highlighted in that document use the framing of TOK (a part of the DP core, not the CP core), however there are also effective links to other subjects which could be taken by CP students.

Overall, there is some evidence of EoPP 15 being embedded into the CP through interdisciplines such as ESS and Literature and Performance and in Mathematics: Applications and Interpretation. However, because these curriculum components are not a compulsory part of the curriculum for students, and because neither the FPIP nor the parts of the core analysed in this benchmarking contain explicit evidence of EoPP 15, the final embeddedness judgement is Moderate.

---

[396] *DP: ESS TSM.*

Extracted Highlights (6.2.15)

- There are some examples in the PYP documents examined here regarding how the individual nature of specific subjects could be taken into account in PYP teaching and learning, but the specific qualities of individual subjects are clearly a lower priority in these resources compared to the transdisciplinary framework. The lack of specific guidance related to the individual nature of disciplines in the PYP documents examined suggests a Low embeddedness judgement for EoPP 15.
- The MYP documentation examined shows High embeddedness of EoPP 15, as there are examples of interdisciplinary units which focus on the inherent nature of the different disciplinary areas being combined or put into conversation with one another.
- Similarly, DP resources indicate that the programme puts the individual nature of disciplines in a foundational place within the interdisciplinary elements of the curriculum. As a result, the embeddedness judgement for EoPP 15 in the DP is High.
- CP documentation indicates that EoPP 15 is embedded into the CP through interdisciplines. However, because these subjects are not a compulsory part of the curriculum, and because neither the FPIP nor the parts of the core analysed in this benchmarking contain explicit evidence of EoPP 15, it was judged that the programme shows Moderate embeddedness for EoPP 15.

6.2.16 EoPP 16: To provide continuing professional development opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies – Professional development for teachers on the topic of interdisciplinary learning cannot be a one-off or done quickly, but should be a continuous effort to develop and improve. Specifically, teachers should be supported to learn new content areas (including developing understanding outside of their disciplinary specialism) and to discover valuable pedagogic approaches for the encouragement of interdisciplinary learning.

	EoPP 16: To provide continuing professional development opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies			
Programme:	PYP	MYP	DP	CP
Embeddedness:	Moderate	Low	Moderate	Low

Cross-Programme Context: N/A.

PYP Embeddedness Judgement:
The number of references to CPD within the PYP documents examined here are relatively low compared to the statements with relevance to other EoPPs in this list. As a result – and because these documents do not contain explicit details on exactly how, when, or where CPD will take place for PYP teaching staff – it would be unrealistic to judge that embeddedness of EoPP 16 was High in the PYP based on the documents analysed here. CPD is something that the IB centrally enables and guides but does not mandate at a granular level in IB World Schools. Nonetheless, the PYP documentation does give some indications that CPD of the format that aligns with this EoPP is expected for PYP teaching staff, therefore the embeddedness judgement has been finalised at Moderate.

There is evidence in the PYP documentation examined here that professional development for PYP teaching staff should be a continuous process that assesses the needs of teachers in relation to the curriculum (which is fundamentally transdisciplinary) and responds accordingly. For example, in *PYP: FPIP – Learning and Teaching* it is suggested that assessment of students should also be used to identify priorities in professional development.[397]

Elsewhere, in *PYP: FPIP – The Learning Community*, it is suggested that "ongoing professional learning and mentoring programmes" should be developed into a collaborative community, and improvements to transdisciplinary learning are clearly a key aim of such learning teams. The "collaborative approach puts students at the centre and aims to ensure a holistic, transdisciplinary and coherent learning experience for them".[398] As such, although these comments do not describe compulsory features of IB World School behaviour, the suggestion within documentation is that CPD would respond to the needs of staff to develop transdisciplinary teaching methods. Later in the same document, it is argued that:

> "whole-school involvement in developing the programme of inquiry is professional development for all. It can strengthen each teacher's understanding of underlying

---

[397] *PYP: FPIP – Learning and Teaching*, p. 68.
[398] *PYP: FPIP – The Learning Community*, p. 28.

educational theories and is an opportunity to share experiences, ideas, processes and imaginings to transcend subjects."[399]

This is perhaps the clearest statement in the documents examined here that CPD should allow teachers to develop transdisciplinary teaching methods. However, because such comments are relatively low on detail, and describe hopes and suggestions rather than demonstrable outputs, the overall judgement for embedding this EoPP can be no higher than Moderate.

MYP Embeddedness Judgement:
There are some scattered references to CPD in the MYP documentation analysed for this benchmarking, however there is not a great deal of sustained commentary on what MYP CPD looks like for teaching staff, and very little of it is explicitly linked to the development of interdisciplinary knowledge-areas or effective pedagogies. It is possible that further details might exist in other MYP documentation and resources, but based on the resources examined here, the embeddedness judgement for EoPP 16 in the MYP is Low.

MYP: FPIP does state, under the heading of "collaborative curriculum planning", that this should involve "opportunities for professional development that furthers each teacher's understanding of their subject needs and of ATL and the global contexts".[400] This is a very general statement about CPD, within which it could be interpreted that teachers will develop interdisciplinary knowledge and pedagogies, but these areas are not clearly prioritised by that statement.

MYP: Fostering Interdisciplinary Teaching and Learning suggests that one of the benefits of interdisciplinary teaching and learning for teachers is that a curriculum of that type "offers opportunities for rich and authentic professional development with colleagues from other disciplines or subject groups".[401] Although this is no doubt true – as teachers collaborate they will provide a type of informal CPD to one-another through these interactions – this does not necessarily equate to the need for formal and ongoing CPD opportunities implied by EoPP 16. Similarly, the same document argues that:

> "Analysing students' interdisciplinary learning entails an important professional development opportunity for teachers who begin to understand how MYP subjects and subject groups interact, overlap, challenge and complement one another. MYP criteria for interdisciplinary learning provide the starting place for these powerful conversations".[402]

Again, although this is undoubtedly true, the *opportunity* for CPD around the issue of interdisciplinarity is not the same as guaranteeing that it takes place in a formal way. As a result, the embeddedness judgement of EoPP 16 in the MYP is Low because although there is some level of engagement with the need for CPD, and with the fact that interdisciplinary

---

[399] *PYP: FPIP – The Learning Community*, p. 33.
[400] *MYP: FPIP*, p. 44.
[401] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 2.
[402] *MYP: Fostering Interdisciplinary Teaching and Learning*, p.40.

teaching and learning lean on effective CPD for that area, it not clearly stated in these resources that all IB teaching staff will have CPD which satisfies those aims.

DP Embeddedness Judgement:
The DP makes a number of references to professional development across a range of resources analysed in this benchmarking. As with other IB programmes, the level of flexibility for schools' contexts results in the degree of detail on DP CPD being scarce in some areas. So, although there is good evidence here that CPD will be expected for all DP teaching staff, it is only implied and not guaranteed that this will focus on interdisciplinary content areas and pedagogies. As a result, the embeddedness judgement for EoPP 16 in the DP is Moderate.

One of the firmest statements on CPD in the DP comes in *DP: CAS Guide*, where it is stated that:

> "It is a condition of Diploma Programme authorization that all members of the school community demonstrate a commitment to CAS. The school must therefore provide the budget, time, staffing, professional development and resources necessary to run a successful CAS programme. The extent of the budget and resources will depend on the individual school's situation, including student numbers and local conditions".[403]

Although this does still leave a high level of flexibility for local circumstances, the implication of this statement is that CPD is a vital criterion for DP authorisation. The fact that this comes in the context of a discussion of CAS (which although not guaranteed to be interdisciplinary, at least lends itself to sitting beyond the boundaries of single subjects) implies that this CPD may have interdisciplinary elements. At another point in this guide it is also stated that "appropriate time for the professional development of the CAS team is also a priority".[404]

DP: FPIP also explains that CPD is an expected part of the ongoing delivery of the DP, though it does not specify that interdisciplinarity must be the focus of that CPD. One of the five highlighted key areas that schools need to monitor for cyclical review and programme development is "ongoing professional development".[405] Moreover, in regards to the professional development of new members of staff, it is stated that "teachers should access IB training as a matter of urgency".[406] Also, "the [DP] coordinator will wish to ensure that teachers have received appropriate IB-authorized training, frequently a very significant annual budget item for IB World Schools".[407]

Indeed, *DP: FPIP* has the most relevant section in regard to this EoPP, one named "Professional Development". Although this does not explicitly mention interdisciplinary methods and content, it does suggest that "professional learning can be viewed as an ongoing commitment by teachers, supported by the school, to develop the learner profile attributes in their own practice". As such – and in combination with the aim of developing "a culture of collaboration that is embedded into working practices: trust and risk-taking are encouraged;

---

[403] *DP: CAS Guide*, p. 36.
[404] *DP: CAS Guide*, p. 33.
[405] *DP: FPIP*, p. 21.
[406] *DP: FPIP*, p. 21.
[407] *DP: FPIP*, p. 25.

teachers openly share their professional practice" – it does seem likely that interdisciplinarity will be a feature of this CPD, even if not explicitly prescribed.[408]

CP Embeddedness Judgement:

Regarding professional development, the most relevant section of CP resources analysed in this benchmarking is the "Professional Development" section of *CP: FPIP*. This guide states that "a school wishing to implement the Career-related Programme needs to make a commitment to ongoing teacher professional development".[409] There are some specific PD requirements that all schools delivering the CP will need to adhere to, for instance co-ordinators of parts of the core such as the Reflective Project are required to attend relevant workshops. In general terms the top-level policy is that "Professional development should be ongoing for all teachers in a school, irrespective of their experience, as even experienced teachers will need to keep up to date with course developments".[410] As EoPP 16 suggests, therefore, the continuous nature of PD is presented as a priority in the CP.

Where the CP documents analysed here do not provide explicit content related to EoPP 16 is in relation to the fact that CPD should have some degree of focus on interdisciplinary pedagogy or interdisciplinary content. This is a common issue, to a greater or lesser extent, across all IB programmes. Although the collaborative nature of PD opportunities described in the documentation, and the networking opportunities such as IBEN, could lead to interdisciplinary CPD, there is no direct link drawn in this documentation between interdisciplinarity and professional development.

Overall, the embeddedness judgement for EoPP 16 in the CP has been finalised at Low. It falls slightly below the DP judgement for this promising practice as a result of the fact that PD is described in slightly less detail and in a more restricted range of the documentation relevant to CP compared to that of DP.

---

[408] *DP: FPIP*, pp. 44-46.
[409] *CP: FPIP*, p. 33.
[410] *CP: FPIP*, p. 33.

Extracted Highlights (6.2.16)

- PYP documentation examined indicates that professional development for PYP teaching staff should be a continuous process that assesses the needs of teachers to develop transdisciplinary teaching methods. However, because references related to EoPP 16 lack detail, and describe hopes and suggestions without demonstrable outputs, the overall embeddedness judgement for EoPP 16 is Moderate.
- The MYP documentation assessed showed that there are implicit and scattered references to CPD, with a lack of detailed information around the format and content in relation to the development of interdisciplinary knowledge-areas and pedagogies. For this reason, the embeddedness judgement for EoPP 16 in the MYP is Low.
- DP documentation examined includes references to PD across a range of resources. However, as there is a level of flexibility for schools to implement CPD, it is only implied and not guaranteed that CPD will focus on interdisciplinary content areas and pedagogies. As a result, the embeddedness judgement for EoPP 16 in the DP is Moderate.
- According to CP documentation analysed here, there are some specific PD requirements that all schools delivering the CP need to adhere to. However, the lack of explicit statements and explanations regarding the focus of CPD on interdisciplinary pedagogy or interdisciplinary content suggests a Low embeddedness for EoPP 16. The judgement level was considered lower than the DP because PD comments in CP documentation lack detail and are included in a more restricted range of the documentation relevant to CP compared to that of DP.

6.2.17 EoPP 17: To encourage and enable collaborative practices within schools which encompass teacher-teacher collaboration within an effective format but also involve a school-wide effort

– Collaboration between teachers is a highly effective way of building innovative methods and developing knowledge of useful interdisciplinary content areas. For this collaboration to be enabled it should be a whole-school effort including all elements of a school's administration to support collaborative practices. Moreover, the format of that collaboration should be carefully considered – with the communities of practice model showing particular promise in helping teaching professionals to expose one-another to effective practices.

	EoPP 17: To encourage and enable collaborative practices within schools which encompass teacher-teacher collaboration within an effective format but also involve a school-wide effort			
Programme:	PYP	MYP	DP	CP
Embeddedness:	High	High	High	High

Cross-Programme Context:

- The IB curriculum components (LP, ATT, ATL) emphasise the importance of collaboration. Specifically of relevance to EoPP 17 is the Approaches to Teaching Principle "Focussed on Effective Teamwork and Collaboration". The LP Attribute "Communicators", which should be modelled by all the whole learning community, is also relevant here.

PYP Embeddedness Judgement:

Teacher-teacher collaboration, the involvement of the wider school in collaborative practices, and the notion of a wider community of practice are all embedded effectively into the PYP documentation examined in this benchmarking. As such, the embeddedness judgement for EoPP 17 is High.

"Collaboration" is one of the most frequently used words in all pillars of the *PYP: FPIP*, and although a certain proportion of that relates to student-student collaboration, there is also significant and lengthy discussion of teacher-teacher collaboration including how this should be practically enabled and encouraged. *PYP: FPIP – The Learning Community* exemplifies this when it provides an overview, stating:

> "Teachers actively contribute to the learning of students and colleagues through collaborative practice. They take time to plan, assess and learn together—inquiring into the effectiveness of their teaching, and reflecting on its impact on learning. They ensure their professional dialogue is open and honest so that learning and teaching becomes the best it can be."[411]

Following this statement, a practical list of example activities is given which would enable schools to encourage teachers to collaborate. Overall, there are so many statements on teacher-teacher collaborating in the PYP documents examined here that it is unquestionably a priority in the PYP, and therefore easily satisfies this component of EoPP 17.

---

[411] *PYP: FPIP – The Learning Community*, p. 3.

Moreover, school-wide collaborative practices are also discussed in this documentation. For example, in a subsection describing the PYP's "commitment to collaboration" it is explained that "Collaboration is apparent at a school-wide level, as well as in day-to-day and moment-to-moment learning and teaching. The learning community collaborates in policy development, resource planning and allocation, learning space design, and culture-building".[412] The ethos of school-wide collaboration is also given practical examples, for instance the figure on page 39 of *The Learning Community* which describes how to connect pedagogy with classroom design and:

> "may be used to facilitate the conversation in the design of new spaces or modification of current learning spaces involving teachers, administrators, business managers, architects and students. The figure may also be used by teachers and students in considering how they can optimize the design of their learning spaces."[413]

The fact that general statements about school-wide collaboration are substantiated with such practical ideas is a clear sign that this element of EoPP 17 is embedded to a high degree also.

Finally, although the exact phrase "communities of practice" may not feature in the documentation analysed here, it is evident that the same idea is manifested in slightly different language, and can apply both at the individual school level and the wider IB level. This idea is even embedded as one of the "pillars" of the *PYP: FPIP*, with "the learning community" being defined in the glossary: "the learning community refers to everyone involved in the life of the school, locally and globally".[414] Whether it is through encouragements to take part in IB-wide global collaborative networks, or through more local community activities, the idea of PYP teaching being developed as part of a wider community of PYP practitioners is clearly evident in the documentation examined here.

MYP Embeddedness Judgement:
The embeddedness judgement for EoPP 17 in the MYP is High. This is a result of the fact that teacher-teacher collaboration is clearly described in multiple places within the resources analysed here. Moreover, there are sufficient relevant comments for the subcomponents of the EoPP, explaining how teacher-teacher collaboration would be framed as part of a school-wide effort and with elements of the "communities of practice" model.

> "In MYP schools, collaborative planning is vital. Time for collaborative planning must be managed systematically and effectively, and it must involve all teachers. Meeting time is especially important for developing horizontal and vertical articulation of the curriculum.
> • As teachers plan collaboratively to explore global contexts and develop inquiry into key concepts within their subjects, opportunities will emerge in which two or more subject groups can join together to create an integrated inquiry. As teachers identify

---

[412] *PYP: FPIP – The Learning Community*, p. 4.
[413] *PYP: FPIP – The Learning Community*, p. 39.
[414] *PYP: FPIP – The Learning Community*, p. 65.

complementary content, skills and concepts, they can plan MYP units that build on this potential integration.
• The Fostering interdisciplinary teaching and learning in the MYP teacher support material provides examples of school structures that can facilitate collaborative planning between and among subjects".[415]

This statement in *MYP: Fostering Interdisciplinary Teaching and Learning* clearly demonstrates the MYP's emphasis on collaborative practices and explains how these should "involve all teachers". Moreover, as that statement makes clear, the corresponding teacher support material does indeed contain practical examples of how school structures can facilitate this collaboration.[416]

There are also encouragements of teacher-teacher collaboration within multiple MYP resources analysed in this benchmarking. Emphatic statements are found near the start of a subject-area guide. In *MYP: Individuals and Societies Guide*, it is stated that "MYP standards and practices require schools to facilitate and promote collaborative planning for the purpose of curriculum development and review".[417] This fairly prescriptive statement is also supported by other documents, for example *MYP: Fostering Interdisciplinary Teaching and Learning* suggests that some of the benefits of an interdisciplinary curriculum, for teaching are that it:

"increases collaboration across subject groups and fosters collegiality
• allows subject groups to share responsibility for developing content, skills and processes (managing time effectively)
• offers opportunities for rich and authentic professional development with colleagues from other disciplines or subject groups".[418]

This statement is less concrete about the fact that teacher-teacher collaboration must necessarily happen, and more suggestive that it could happen. The same could be said of a later comment in the same document:

"While interdisciplinary teaching can be done by a single teacher, most typically it is a collaborative effort. In terms of assessment, the collaboration matters because it enables teachers to draw on their particular areas of expertise and their subject-specific goals to assess student work. To move from a multidisciplinary assessment (in which teachers only consider the perspective of their individual subjects) towards an interdisciplinary approach, teachers can engage in collaborative assessments of student work".[419]

It is therefore clear that there is a combination of prescriptive and recommendation-based comments on collaborative practices in the curriculum.

Regarding the aspect of EoPP 17 which suggests that teacher-teacher collaboration should be framed as part of a school-wide effort, *MYP: FPIP* provides the best evidence that this is

---

[415] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 47.
[416] *MYP: Fostering Interdisciplinary Teaching and Learning TSM*.
[417] *MYP: Individuals and Societies Guide*, p. 17.
[418] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 2.
[419] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 50.

the case in the MYP. Pages 30-34 of that document give a breakdown of many different staff roles in an MYP school, including librarian and counsellor. The way these roles are described implies that such staff, who may not be teachers, would support the collaborative work that goes towards the development of an effective interdisciplinary curriculum.[420] Similarly, in a section on inclusivity in the IB, *MYP: FPIP* states that "inclusion succeeds when a school-wide culture of collaboration encourages and supports inquiry and problem-solving".[421] Most of all, though, evidence for whole-school efforts in embedding interdisciplinary learning through collaboration can be found in the specific section of *MYP: FPIP* named "Whole-school curricular planning".[422]

Finally, the phrase "community of practice" is used once in the IB documents examined here. In *MYP: FPIP*, it is suggested that "the MYP identifies prescribed key and related concepts. These concepts ensure the development of a rigorous curriculum and promote a shared community of practice among IB World Schools offering the MYP".[423] There are also scattered suggestions within these MYP resources which suggest that a broader community of practice can evolve among MYP practitioners.

DP Embeddedness Judgement:
The embeddedness judgement of EoPP 17 in the DP is High as a result of the fact that teacher-teacher collaboration is discussed in a variety of the audited documents, and the sub-features of EoPP 17 (whole-school contribution and the communities of practice model) are also described.

The idea of teacher-teacher collaboration is described in multiple places in *DP: FPIP*. For example, it is explained that:

> "Teachers can improve practice by sharing ideas with their colleagues and observing classes. Teacher collaboration should be seen as an important aspect of professional development. Common planning and meeting time is crucial for successful implementation".[424]

This comment clearly describes teacher-teacher collaboration in an effective format, as required by EoPP 17. Moreover, *DP: FPIP* contains a section on "Professional Development" in which a wide number of collaborative measures are described, and which are required to take place due to the fact that teachers are expected to model the Learner Profile attributes they are seeking to develop in their students (including "Communicators").[425]

The fact that the whole school should be involved in enabling teacher-teacher collaboration is referenced in several places. For instance, regarding curriculum support for the core, *DP: FPIP* states that "the DP coordinator should ensure that the TOK teacher and the individual subject teachers collaborate in developing an understanding of the requirements of TOK

---

[420] *MYP: FPIP*, pp. 30-34
[421] *MYP: FPIP*, p. 27.
[422] *MYP: FPIP*, pp. 44-45.
[423] *MYP: FPIP*, p. 15.
[424] *DP: FPIP*, p. 61.
[425] *DP: FPIP*, p. 44.

across the DP".[426] The core itself requires a high level of whole-school collaboration in order for it to function as described in documentation, and this fact is underscored by comments in subject documentation such as *DP: Literature and Performance Guide*'s suggestion that "within a whole-school context teachers should be mindful of promoting concurrency of learning through cross-curricular links to other subjects, where appropriate, and in particular to theory of knowledge".[427]

Elsewhere, *DP: CAS Guide* even suggests that staff collaboration in the DP may go beyond the school level.

> "There may be opportunities for CAS to collaborate with schools in other localities—national or international. Lasting relationships leading to long-term sustainable CAS projects may offer rewards for all concerned. CAS coordinators are encouraged to use the CAS forum on the OCC as a means of developing networks with other schools, sharing of resources and obtaining/providing advice".[428]

This nod to the wider IB community is developed further in discussion of the IB Educator Network (IBEN). This is only described briefly in *DP: FPIP*, but there is an indication that it has elements of the communities of practice model, and there is a link to interdisciplinarity judging by the stated priority of "the need for teachers to continue to work closely and collaboratively on sharing good practice, discussing student progress and highlighting opportunities for interdisciplinary learning".[429]

CP Embeddedness Judgement:
For EoPP 17 to be embedded to a High degree it is necessary not only for teacher-teacher collaboration to be enabled but for this to be a whole-school effort and one structured in a promising structure such as the communities of practice model. On all of these points the CP documentation analysed here demonstrates that these are features of the programme curriculum. As a result, the embeddedness judgement for EoPP 17 in the CP is High.

The fact that teachers should collaborate with one another in the CP is established in *CP: FPIP*. According to that guide, "strong collaboration in planning and assessment between all teachers involved in the programme" is a key feature of the programme.[430] The same document also goes on to suggest that this collaboration is not an isolated task for teachers but is part of the culture of the school:

> "Collaborative planning and reflection must take place regularly and systematically in support of programme implementation. It can help schools develop a curriculum that reflects and supports the school's identity, including elements such as education for citizenship, experiential education and service within the community. Collaborative planning is based on agreed expectations for student learning. The importance of collaborative planning is highlighted in the programme standards and practices, and

---

[426] *DP: FPIP*, p. 32.
[427] *DP: Literature and Performance Guide*, p. 13.
[428] *DP: CAS Guide*, p. 42.
[429] *DP: FPIP*, p. 22.
[430] *CP: FPIP*, p. 14.

evidence of productive planning times is required at authorization and evaluation. Collaborative planning and reflection ensures that all teachers have an overview of students' learning experiences".[431]

CP: FPIP thus suggests that teacher-teacher collaboration is something to be enabled in the school as a whole. Even though this collaboration is not explicitly linked to interdisciplinarity, the fact that collaboration should take place between different subject areas to develop effective practices and enable collaborative planning and reflection clearly embeds the purpose of EoPP 17.

CP: FPIP also explains that the collaboration in question may go even further than being school-wide. "Participating schools work in close collaboration with further and higher education institutions and with the employment sector both locally and internationally".[432] This is an interesting feature of the CP, that its career-pathway focus suggests that schools should reach out to local and international education institutions and employers, in order for the programme to be as useful as possible for students. Elsewhere in *CP: FPIP*, the extension of collaboration beyond the single-school-level also suggests that something like a communities of practice model could be employed by CP teachers.

> "Developing and maintaining the school as a professional learning community is a key priority. Over time, the opportunity for reflection and innovative professional development and practice might grow because less time needs to be spent on basic implementation. The IB educator network (IBEN) can provide a high-quality IB experience for teachers. Teachers should be encouraged to become directly involved in IBEN activities".[433]

Through IBEN, and other collaborative forums enabled by the IB, it seems likely that teachers from different disciplinary backgrounds could come together to share expertise and reflectively develop best practice.

Overall, from the accumulation of these comments in *CP: FPIP*, even though interdisciplinarity may not be explicitly discussed, the clear framework for teacher-teacher collaboration in an effective structure is evidently prioritised by the programme, making the embeddedness judgement for EoPP 17 in the CP High.

---

[431] *CP: FPIP*, p. 22.
[432] *CP: FPIP*, p. 7.
[433] *CP: FPIP*, p. 24.

- Elements such as teacher-teacher collaboration, the involvement of the wider school in collaborative practices, the notion of a wider community of practice, participation in IB-wide global collaborative networks, and local community activities are all evident in PYP documentation assessed – suggesting High embeddedness for EoPP 17.
- MYP, DP, and CP documentation assessed provides detailed evidence on teacher-teacher collaboration, as well as explanations on how teacher-teacher collaboration could be achieved as part of a school-wide effort (with a particular focus on "communities of practice"). As a result, the embeddedness judgements for EoPP 17 in MYP, DP and CP are High.

6.2.18 EoPP 18: To put time aside in the curriculum which is explicitly for teachers to reflect and collaborate around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity – As time is such a valuable commodity for teaching professionals, it is important that collaboration and reflection on practice are not simply expected to fill curriculum gaps, but are explicitly planned-for with time set aside only for the development of interdisciplinary best practice. Having this time explicitly allocated for interdisciplinarity not only highlights that it is a curriculum priority, but also enables teachers to develop new content knowledge, effective pedagogies, and the highly important enthusiasm for interdisciplinary learning.

	EoPP 18: To put time aside in the curriculum which is explicitly for teachers to reflect and collaborate around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity			
Programme:	PYP	MYP	DP	CP
Embeddedness:	Low	Moderate	Moderate	Moderate

Cross-Programme Context:
- Collaboration and reflection, as general principles, are embedded in the LP and the ATT. However, explicit prioritisation of putting time aside for these activities is beyond the scope of the descriptions in those curriculum components.

PYP Embeddedness Judgement:
There are two qualities required for High embedding of EoPP 18 to be satisfied. Firstly, time should be set aside for teacher reflection and collaboration. Secondly, that reflection and collaboration should explicitly focus on interdisciplinarity (or transdisciplinarity in the case of the PYP) and how it can be fostered in the school. On both of these counts, there is some evidence in the PYP documentation examined here that these benchmarks *could* be hit in some schools, but the documentation does not explicitly make EoPP 18 a *requirement*. As with some other EoPPs in this list, the nature of the IB's relationship with schools makes judgement against these EoPPs challenging from documentation alone. Because IB World Schools function in so many different local circumstances and jurisdictions, there is necessarily a large element of flexibility built into the PYP curriculum around issues such as CPD and timetabling. However, these benchmarking tool judgements are based purely on the evidence found in the selected documentation. As a result, although there is evidence of the IB attempting to make EoPP 18 possible in IB World Schools, the final judgement is Low embedding of the EoPP because there is no guarantee that time set aside for collaborative transdisciplinary planning and reflection will be a part of the curriculum in schools.

Perhaps the most relevant subsection of any of the PYP documentation analysed here is that addressing "Making time for Collaboration" within *PYP: FPIP – The Learning Community*.[434] This short subsection clearly addresses the idea that time should be set aside in order for teachers to reflect and develop better practice together. This is an important component of EoPP 18, however there are some caveats. The document recognises that the examples it

---

[434] *PYP: FPIP – The Learning Community*, p. 31.

gives of how to put time aside for teacher-teacher collaboration "provide a starting point, although local and national regulations governing each school will influence decisions of this nature".[435] As such, although the advice on how to put time aside may be effective, it is framed less concretely than many other elements of the PYP curriculum. Having said that, it is important to note that the suggestions here are intelligently thought-out and provide a large number of possible alternatives for schools in different local circumstances.

It should also be noted that the "Making time for Collaboration" subsection does not explicitly make links to building methods or enthusiasm for interdisciplinary or transdisciplinary learning. There is one line which suggests that effective collaboration will "address vertical and horizontal articulation of subject knowledge, skills, concepts and attributes of the learner profile".[436] However, this does not quite satisfy the criteria of EoPP 18 which argues for time to be set aside *explicitly* for interdisciplinarity.

Overall, there is clearly recognition in this documentation for the need for time to be set aside for teacher reflection. And, elsewhere, there is some evidence (see PYP judgements for EoPPs 16 and 17) that collaborative practices are likely to help develop transdisciplinary teaching methods. However, the lack of explicit links between these ideas and the fact that the documentation only handles such issues with a light touch, means that the judgement falls at the level of Low embeddedness.

MYP Embeddedness Judgement:
Overall, there is not a large amount evidence within the MYP documents analysed here which relates to EoPP 18, however, that evidence which does exist is clear at least about the need for time to be put aside for teacher-teacher collaboration. The embeddedness judgement for EoPP 18 in the MYP is Moderate because some explicit comments do exist in the documentation which suggests the necessity of setting this time aside, however practical details for building enthusiasm for interdisciplinarity and putting time aside for reflection is less clear than time put aside for collaboration.

MYP: FPIP states that "the school must be able to provide the resources necessary to implement the programme, including: […] • dedicated meeting time for teachers' collaborative planning".[437] Further detail is then provided five pages later when it is explained that:

> "schools must provide dedicated meeting time for collaborative planning. In MYP schools, meeting time is crucial, must be managed systematically and effectively, and must involve all teachers. Meeting time must be used to develop vertical and horizontal articulation of the curriculum across and between year levels, and across and within subject groups. ATL skills must be discussed and planned, and key concepts and global contexts considered across years. It is good practice to write unit plans in teams".[438]

---

[435] *PYP: FPIP – The Learning Community*, p. 31.
[436] *PYP: FPIP – The Learning Community*, p. 32.
[437] *MYP: FPIP*, p. 39.
[438] *MYP: FPIP*, p. 44.

This statement explicitly discusses putting time aside and suggests that building links across the subject groups of the curriculum will be a priority for this meeting time. Elsewhere, in *MYP: Fostering Interdisciplinary Teaching and Learning*, it is also stated that "in MYP schools, collaborative planning is vital. Time for collaborative planning must be managed systematically and effectively, and it must involve all teachers. Meeting time is especially important for developing horizontal and vertical articulation of the curriculum".[439] This is effectively a restatement of the content found in *MYP: FPIP*, but its repetition in a second document with a focus on interdisciplinarity adds further emphasis to the fact that time put aside for collaboration is targeted towards developing effective interdisciplinarity in the curriculum.

As the MYP judgement for EoPP 16 makes clear, the level of CPD that enables teachers to reflect on their interdisciplinary pedagogy and develop new and effective methods (as well as passion for interdisciplinarity) is only embedded to a low level. As a result, this aspect of EoPP 18 is also not embedded to a significant degree, and therefore does not reach the same level of embeddedness as the collaborative component of EoPP 18.

Overall, balancing the clear statements on time put aside for collaboration with the lack of such clear statements on time being put aside for reflection and personal development, the final embeddedness judgement for EoPP 18 in the MYP is Moderate.

DP Embeddedness Judgement:

There is evidence in the DP documentation analysed in this benchmarking that there is recognition of the fact that time needs to be put aside for teachers to collaborate and develop the curriculum. However, there is not a clear statement that the time put aside would be specifically for the development of higher quality interdisciplinarity. As a result, the embeddedness judgement for EoPP 18 in the DP is capped at Moderate.

The most important source in this benchmarking with relevance to this EoPP in the DP is the programme's FPIP. In multiple places, this resource explicitly describes the need for time to be put aside in the curriculum for a variety of purposes. For example, it is stated that "teachers require time to meet students and monitor their progress, as well as collaborating on curriculum development".[440] Elsewhere in the document it is suggested that:

"Teachers can improve practice by sharing ideas with their colleagues and observing classes. Teacher collaboration should be seen as an important aspect of professional development. Common planning and meeting time is crucial for successful implementation".[441]

Earlier in the document, slightly more detail is given as to what teachers might collaborate on in this time put aside:

"These meetings can also be critical in providing time for teachers to work collaboratively to develop effective timelines for assessment, thereby ensuring that

---

[439] *MYP: Fostering Interdisciplinary Teaching and Learning*, p. 47.
[440] *DP: FPIP*, p. 32.
[441] *DP: FPIP*, p. 61.

students are not unduly taxed, with multiple assignments due at any one time. In addition, these meetings allow teachers to share methodologies for ensuring learning success and academic honesty".[442]

Overall, all of these statements clearly recognise the need for time to be put aside, and they touch on ideas such as collaboration and curriculum development (as mentioned by EoPP 18) as well as other ideas like timetabling and ensuring academic honesty. There is not, however, explicit explanation of how this time put aside would provide specific benefits to the interdisciplinarity on the curriculum. One could argue that this is implicit in the idea of teachers collaborating from different parts of the curriculum, but because there are no clear statements which ensure meeting time would be targeted at interdisciplinarity the embeddedness judgement is Moderate.

CP Embeddedness Judgement:

The *CP: FPIP* provides clear statements on the need for meeting time to be put aside for collaboration and joint reflection on teaching practices. Because interdisciplinarity is not explicitly mentioned in this context the embeddedness judgement cannot reach High, but the specific sections of the document which address the need for joint meeting time evidently embeds EoPP 18 to a Moderate level.

In relation to collaborative planning, *CP: FPIP* emphasises that:

> "The importance of collaborative planning is highlighted in the programme standards and practices, and evidence of productive planning times is required at authorization and evaluation. Collaborative planning and reflection ensures that all teachers have an overview of students' learning experiences".[443]

It is possible that this overview of learning experiences shared across the teaching body would enable effective interdisciplinary learning, however the statement does not quite go as far as to explicitly reference integrative learning in any form.

On the following page of *CP: FPIP*, a specific subsection describing "Meeting Time" explains that:

> "Schools must provide dedicated meeting time for collaborative planning. In Career-related Programme schools, meeting time is crucial, must be managed systematically and effectively, and must involve all teachers. Meeting time must be used to develop vertical and horizontal articulation of the Career-related programme across and between each year level. Additional planning time must include discussions involving differentiation, learning support, learner profile development and international-mindedness. Where there is more than one teacher of the same course, it is good practice to write unit plans in teams in order to collaboratively develop the areas stated above".[444]

---

[442] *DP: FPIP*, p. 24.
[443] *CP: FPIP*, p. 22.
[444] *CP: FPIP*, p. 23.

This places a very clear emphasis on the need for meeting time to be put aside, and it does so in a way that appears to recognise that the collaborative reflection that is so beneficial cannot simply be hoped to develop in gaps in the curriculum, but must be specifically timetabled. This is an effective demonstration of aspects of EoPP 18, but because interdisciplinarity is not flagged as a priority in this set-aside meeting time, the embeddedness judgement remains at Moderate.

Extracted Highlights (6.2.18)

- In PYP documentation examined, there is evidence which outlines the need to set aside time for teachers' reflection, including the development of collaborative practices that can help teachers develop transdisciplinary teaching methods. However, the lack of *explicit* links in the documentation suggests a Low embeddedness for EoPP 18 in PYP.
- MYP, DP, and CP documents analysed show limited references around EoPP 18. There are some explicit references in some programme documentation that recognise the need for time to be put aside for teacher-teacher collaboration and reflection, but they lack practical explanations on how to build interest and enthusiasm for interdisciplinarity – suggesting Moderate embeddedness for EoPP 18 in all three programmes.

7. Conclusions and Considerations

7.1 Summary of Benchmarking Tool
Table 10: Summary of Benchmarking Tool Embeddedness Judgements

Key: ■ = High embeddedness of element · ◼ = Moderate embeddedness of element · ▨ = Low embeddedness of element · □ = No embeddedness of element

| Elements of Promising Practice (Benchmarking Tool)	PYP	MYP	DP	CP
EoPP 1: To deliver a coherent, research-informed **definition** of interdisciplinary learning, which is guided by the intended **purpose** of deploying interdisciplinarity.	■	■	▨	▨
EoPP 2: To engage clearly and coherently with the differences and similarities between **interdisciplinarity** and other related terms such as **multidisciplinarity** and **transdisciplinarity**.	■	■	▨	□
EoPP 3: To ensure a significant level of teacher **scaffolding** to help students deploy disciplines and interdisciplinarity effectively.	■	■	■	■
EoPP 4: To explicitly link interdisciplinary learning with other features of **constructivist pedagogy**, including concept-based teaching, student-led inquiry, collaboration, and authentic learning.	■	■	■	■
EoPP 5: To clearly articulate and communicate, to staff and students, the **value** and **benefits** of interdisciplinary learning.	■	■	◼	◼
EoPP 6: To promote the use of authentic **problem-solving** and interdisciplinary **project-based** learning as two key tools for developing interdisciplinarity in the classroom.	■	■	■	■
EoPP 7: To create sufficient **flexibility** in the curriculum for teachers to authentically link learning to student interests and new research developments, and to reflectively develop best practice approaches.	◼	■	■	■
EoPP 8: To encourage the use of a wide variety of **multimodal** sources, enabling students to build their own links between disciplines and explore knowledge areas.	■	◼	◼	◼
EoPP 9: To show **proactive engagement** with the key **challenges** which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning.	■	◼	◼	▨
EoPP 10: To develop interdisciplinarity within an **age-appropriate** structure, with scope for **development** along the K-12 age continuum.	■	■	■	■
EoPP 11: To explain the link between interdisciplinarity and key **skills and competences** including communication, critical thinking, synthesis, and metacognitive awareness of perspectives.	■	■	■	■
EoPP 12: To take interdisciplinary learning into account in the **design of assessment**.	■	■	◼	▨
EoPP 13: To **link interdisciplinary assessment** with conceptual understanding, disciplinary grounding, advancement through integration, and critical awareness.	▨	■	■	◼
EoPP 14: To encourage **interdisciplinarity** and individual **disciplines** to **mutually reinforce** one-another; with interdisciplinary methods being used to develop deep and innovative disciplinary understanding.	◼	■	■	■
EoPP 15: To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual **nature of specific disciplines**.	▨	■	■	◼
EoPP 16: To provide **continuing professional development** opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies.	◼	▨	◼	▨
EoPP 17: To encourage and enable collaborative practices within schools which encompass **teacher-teacher collaboration** within an effective format but also involve a **school-wide effort**.	■	■	■	■
EoPP 18: To **put time aside** in the curriculum which is explicitly for teachers to **reflect and collaborate** around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity.	▨	◼	◼	◼

7.2 Conclusions and Findings

Interdisciplinary Learning Across IB Programmes

The application of the benchmarking tool to all four IB programmes (section 6) has allowed Ecctis to build a detailed response to RQ3 – **How does IB programmes' interdisciplinarity approach compare with extant research and global promising practices?** Each programme will be discussed individually below, but it is also possible to take a step back and examine the IB as one unit with a variable approach to interdisciplinary learning.

The explicit focus on interdisciplinary learning in the IB varies; it starts with a transdisciplinary curriculum in the PYP, evolves into an interdisciplinary curriculum in the MYP, before shifting further away from integration and towards disciplinarity in the DP/CP. Within this broad picture of lessening integration as the age of students increases, there are also other trends that can be identified. For example, there are pockets of the IB's curricula in which interdisciplinarity is embedded more strongly than in other parts. There are subject groups in the MYP and subjects in the DP/CP which focus explicitly on interdisciplinarity, whereas there are also others which are more disciplinary in structure. The cores of the programmes also provide some instances where interdisciplinarity is more likely to be embedded than in a single discipline, as these curriculum components often enable students to use multiple disciplines in a project or develop their transferable skills.

The proportion of each level of EoPP judgement in all four IB programmes combined is presented in the following figure:

Figure 10: Summary of Embeddedness Judgement Proportion
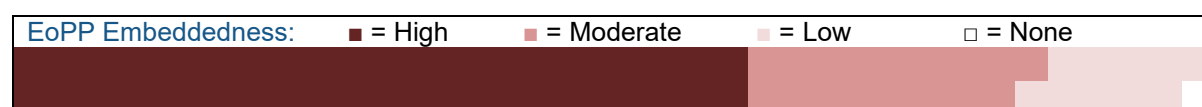
It is thus evident that more than half of the EoPP judgements in the IB show High embeddedness of the promising practice, with the remainder split for the most part between Moderate and Low. Generally speaking, this indicates that the IB as a whole is embedding a good proportion of the identified promising practice for effective K-12 interdisciplinary learning. However, there is also clearly scope to raise some of these embeddedness judgements (see Considerations, below, for further details). When we examine the summary of the benchmarking judgements (section 7.1, above), there are a handful of areas in which High embeddedness was found across all four programmes (EoPPs 3, 4, 6, 10, 11, 17). This indicates that the IB as a whole has strong practices in the following areas linked to effective interdisciplinary learning: scaffolding, pedagogy, problem- and project-based learning, age-appropriateness, development of key skills, and encouraging teacher-teacher collaboration and school-wide contributions. By contrast, the areas showing either an entirety or a majority of EoPP judgements lower than High are discussed in the Considerations.

Interdisciplinary Learning in the PYP

The auditing process found that the PYP explicitly expresses itself as a programme driven by a transdisciplinary structure, with this approach being rightly presented as age-appropriate and able to channel the IB's aim of developing internationally-minded learners who can look beyond boundaries, whether those be cultural/national or disciplinary boundaries.

The proportion of each level of EoPP judgement in the PYP is presented in the following figure:

Figure 11: Summary of PYP Embeddedness Judgement Proportion

EoPP Embeddedness:	■ = High	■ = Moderate	■ = Low	□ = None

Overall, this presents a picture of a substantial proportion of EoPP judgements in the PYP being of High embeddedness, with a small number of Moderate and Low judgements. Generally speaking, the Moderate and Low judgements were related to areas such as CPD, use of disciplinarity, and timetabling staff meetings specifically for development of effective integration.

Regarding the PYP resources included in the audit, and their relative contributions of evidence towards the EoPP judgements: there is less clear differentiation in this programme compared to others, due to the broad role of the PYP: FPIP. With only four individual PYP-specific resources used in this auditing (the four parts of the PYP), all of these contributed substantially to the evidence used for EoPP embeddedness judgements. As would be expected, *PYP: FPIP – Overview* largely contributed evidence related to top-level summaries of the programme, for example, the big picture of how integration occurs in the PYP through the wider constructivist web weaved between the LP, ATT, and ATL. *PYP: FPIP – The Learner* largely contributed through the details it contains about the Exhibition and its explanation of how PYP students could develop specific skills (with potential links to interdisciplinarity). *PYP: FPIP – Learning and Teaching* was perhaps the most frequently used as a source of evidence for forming EoPP judgements in the PYP. This was a result of the fact that it contains the most explicit sections and subsections which discuss transdisciplinary learning and the transdisciplinary programme of inquiry. *Learning and Teaching* also contains some of the most explicit links between transdisciplinarity and the programme's pedagogic approaches (for example through key and related concepts) and the nature of PYP assessment. Finally, *PYP: FPIP – The Learning Community* was drawn upon frequently for a multitude of reasons, but particularly pertinent features included the discussions of collaboration as part of constructivist pedagogy and collaboration between teachers or other members of the learning community. The fact that the programme glossary is found at the end of *The Learning Community* also resulted in this document being drawn upon frequently for EoPP evidence.

Interdisciplinary Learning in the MYP

The auditing process found that the MYP explicitly takes interdisciplinarity into account in the design of the programme structure. There is specific curriculum space given over to fostering interdisciplinary learning, and the idea of interdisciplinarity also features across other parts of

the programme, such as the culminating projects and the fact that subject-areas (rather than isolated disciplines) are used to structure learning.

The proportion of each level of EoPP judgement in the MYP is presented in the following figure:

Figure 12: Summary of MYP Embeddedness Judgement Proportion

EoPP Embeddedness:	■ = High	■ = Moderate	▪ = Low	□ = None

Overall, this presents a picture of a large proportion of High embeddedness judgements, with only a small number of Moderate judgements and one Low judgement. In general, the Moderate and Low judgements were related to areas such as CPD, timetabling (specifically for the development of effective interdisciplinary teaching methods), and the use of strategies to assist the development of high quality interdisciplinarity.

Regarding the MYP resources included in the audit and their relative contributions of evidence towards the EoPP judgements: a large number of MYP resources were used in the audit, and contribution levels varied significantly. The mined evidence for EoPP judgements was dominated in the MYP by the programme FPIP and both the guide and TSM focussing on *Fostering Interdisciplinary Teaching and Learning*. These resources contained by far the most relevant detail about interdisciplinary learning. *MYP: FPIP* contains a glossary with relevant terms but was also drawn upon for evidence on a wide range of topics due to its top-level overview of the programme. Those topics included the structure of the MYP, the role of teachers in facilitating interdisciplinary learning, how the IB's pedagogy enables interdisciplinarity in the MYP, the use of concepts, the development of relevant skills, and how interdisciplinary learning is part of a whole school effort. *Fostering Interdisciplinary Teaching and Learning in the MYP*, and the corresponding TSM, were probably the most significant sources, with their explicit focus on interdisciplinary learning, how it emerges through pedagogic approaches and is tracked through assessment in the MYP, and how interdisciplinarity relates to other subject-areas. Although a large percentage of the mined evidence stemmed from those previously mentioned sources, the other MYP resources examined in the audit also contributed different elements of evidence. For example, *MYP: Projects Guide* was particularly drawn upon for its emphasis on the links between interdisciplinarity and project- and problem-based learning (and how this should flow from students' interests). Specific subject guides and their corresponding TSMs often did not contain considerable detail directly on interdisciplinarity, but there was nonetheless some relevant evidence related to issues such as how interdisciplinary learning might be enabled by use of authentic contexts, development of communication skills, and deployment of key and related concepts in the curriculum.

Interdisciplinary Learning in the DP

The auditing process found that the DP is not an explicitly interdisciplinary programme – taken as a whole – but it does contain some elements which explicitly channel interdisciplinary learning. Specifically, parts of the core lend themselves to interdisciplinarity and some subject

options (such as ESS and Literature and Performance) are highly interdisciplinary. However, it would also be possible to navigate some DP documentation without arriving at the conclusion that interdisciplinarity is a pedagogic priority.

The proportion of each level of EoPP judgement in the DP is presented in the following figure:

Figure 13: Summary of DP Embeddedness Judgement Proportion

EoPP Embeddedness:	■ = High	■ = Moderate	■ = Low	□ = None

Overall, this presents a picture of more than half of the EoPPs being Highly embedded in the DP, but with a significant proportion also falling at the levels of Moderate or Low. Moderate and Low judgements were scattered across a range of areas, but the lowest judgements generally related to definitional clarity of key terms and ideas, and the relationship between interdisciplinarity and CPD.
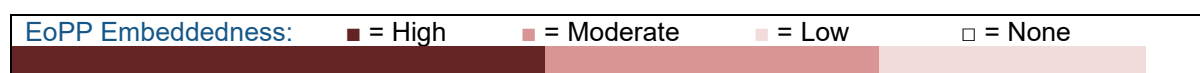
Regarding the DP resources included in the audit, and their relative contributions of evidence towards the EoPP judgements, contribution levels varied significantly. The documents which provided the largest quantities of evidence for the EoPP judgements in the DP were those which relate to parts of the curriculum with an explicit interdisciplinary focus. These include the guides and TSMs for interdisciplinary subject areas – ESS and Literature and Performance – and the *Extended Essay Guide* (with its section on the interdisciplinary world-studies option). Concerning the relationship between interdisciplinarity and individual disciplines, and how teachers practically foster interdisciplinary learning, the interdisciplinary subject guides and their corresponding TSMs were particularly relevant. The *Extended Essay Guide* was the most valuable source within the audit in relation to what interdisciplinary learning means in the DP and how it should be linked to assessment, project-based learning, student interests, and authentic learning experiences. Although these resources dominated the DP's EoPP judgements, the FPIP also provided significant evidence due to its overview of the DP structure and its detail on how this relates to other IB programmes. Issues such as CPD and pedagogic overview were also touched on by the FPIP. The TOK and CAS guides were less influential on the EoPP judgements than the other part of the DP core – the *Extended Essay Guide*. Nevertheless, these resources did contribute some evidence in areas such as the links between interdisciplinary learning and project- or problem-based learning, and between interdisciplinary learning and CPD. Transferable skills and collaboration between students and between teachers was also linked (though rarely explicitly) to interdisciplinarity in TOK and CAS. Subject guides and their corresponding TSMs which are not related to one of the interdisciplinary subjects did also provide some scattered contributions, for example, concerning how concepts and inquiry-based learning might both overlap into interdisciplinarity, or how curriculum flexibility might enable problem-based learning that would have the potential to develop interdisciplinary elements. The *DP: Mathematics Applications and Interpretation Guide* contributed evidence of links between the specific nature of a discipline and how this might blend into interdisciplinarity in the DP.

Interdisciplinary Learning in the CP

The auditing process found that the CP is not an explicitly interdisciplinary programme, though it does contain some curriculum components which are either inherently interdisciplinary or have the potential to develop interdisciplinary learning. Of all four IB programmes, the CP was found to have the lowest explicit embeddedness of interdisciplinary promising practice.

The proportion of each level of EoPP judgement in the CP is presented in the following figure:

Figure 14: Summary of CP Embeddedness Judgement Proportion

EoPP Embeddedness:	■ = High	■ = Moderate	■ = Low	□ = None

Overall, this presents a picture of High embeddedness being found for just under half of the EoPPs, with just one judgement of None and the rest split relatively evenly between Moderate and Low. Generally speaking, the Moderate and Low judgements were often related to areas such as CPD, assessment, and proactive strategies to develop effective interdisciplinary learning. The area of lowest embeddedness was related to the differentiation between key terms in the family of "interdisciplinarity" and clarity regarding how these terms were used.

Regarding the CP resources included in the audit, and their relative contributions of evidence towards the EoPP judgements, in many ways the picture is very similar to that portrayed by the DP resources. This is a result of the substantial amount of shared documentation between these programmes. As with the DP EoPP judgements, the evidence mined for the CP was heavily drawn from the interdisciplinary subject area guides and TSMs (such as ESS and Literature and Performance). Unlike the DP, the CP does not have an Extended Essay element of the core, so the CP judgements could not draw evidence from that guide. Instead, the *Personal and Professional Skills Guide* and the *Reflective Project Guide* both provided some evidence in areas such as the development of transferable skills linked to interdisciplinary learning, the use of project-based learning, and teacher scaffolding of subject integration. The *Reflective Project Guide* also provided some evidence for links between interdisciplinarity and assessment. The *CP: FPIP* was found to share many of the same features as the *DP: FPIP*, and evidence was therefore drawn from this resource to a similar extent as described above. The section on conceptual understanding was a particularly important source of evidence, despite there being little explicit commentary on interdisciplinarity. Besides these CP-specific resources, the subject guides and TSMs shared with the DP contained relevant evidence in the way the DP summary above describes: a scattered manner with generally lower contribution than the specifically interdisciplinary subjects.

Interdisciplinarity Throughout Programmes or in Delimited Interdisciplinary Components?

The process of deploying the benchmarking tool to the selected IB resources revealed that some resources provided far more evidence of EoPP embeddedness than others. As the IB Resources Overview (Section 4, above) indicated, different document types lend themselves to articulating the IB's relationship with interdisciplinarity in different ways. However, it is only by carrying out the benchmarking process that the different levels of contributions from

different resources can be fully appreciated. Because some resources contributed far more evidence than others towards the EoPP embeddedness judgements, this begs the question of which model more accurately describes interdisciplinary learning in the IB: interdisciplinarity as embedded throughout IB programmes, or interdisciplinarity as delimited into specific components of the curriculum?

The answer to this question varies across programmes.

In the PYP, the fact that a smaller number of longer documents was analysed in the benchmarking reduces the possibility that "pockets" of interdisciplinarity would be perceived rather than thoroughgoing interdisciplinarity. Moreover, the transdisciplinary structure of the PYP clearly enables subject integration to take place across the breadth of the curriculum. This is not to say that there are not some components of the curriculum where interdisciplinary promising practice might be more likely to emerge – for instance the Exhibition – but, overall, the PYP's transdisciplinarity was found in the benchmarking to be something that traversed the full curriculum to at least some extent.

In the MYP, embeddedness judgements received a large proportion of evidence from *Fostering Interdisciplinary Teaching and Learning in the MYP* (along with the corresponding TSM). This does create an impression of interdisciplinarity being embedded more thoroughly into one area of documentation rather than across the board in terms of resources. However, although the documentary commentary on how to develop interdisciplinarity in the MYP may be substantially focused in some areas, *Fostering Interdisciplinary Teaching and Learning in the MYP* does make clear that interdisciplinary learning itself is not an isolated part of the MYP curriculum, rather it is something that develops through the subject groups and projects. The MYP, therefore, provides a mixed picture in the tension between thoroughgoing interdisciplinarity and islands of isolated interdisciplinarity. In terms of which *resources* describe interdisciplinarity at length, the specific guide and TSM focused on fostering interdisciplinary learning are dominant. However, in terms of overarching *curriculum structure*, interdisciplinary learning is more diffused throughout the programme.

In the DP, embeddedness judgements were dominated by components of the programme core and interdisciplinary subjects such as ESS and Literature and Performance. The fact that some specifically interdisciplinary subjects featured substantially more evidence of interdisciplinary learning compared to more traditionally disciplinary subjects does suggest that the DP follows a model more closely resembling isolated curriculum islands of interdisciplinarity, rather than programme-traversing interdisciplinarity. However, the core plays a key role in altering this picture. *DP: Extended Essay Guide* was a particularly strong source of explicit links to interdisciplinarity, while *DP: TOK Guide* contained a broad range of more implicit links (see Appendix 2) and *DP: CAS Guide* included relevant links via skills development. These parts of the curriculum therefore serve to join-up the scattered focuses on interdisciplinarity found elsewhere in the curriculum. That is not to say that all DP students will experience the same degree of interdisciplinarity in their courses; if students do not choose an interdisciplinary subject such as ESS, and choose to do a single-discipline Extended Essay, then they may only experience sporadic interdisciplinary learning through other parts of the core. Overall, the DP structure of interdisciplinarity may be more based on delimited interdisciplinary components than the MYP structure, but there is still scope for interdisciplinarity that uses the core to traverse the programme as a whole. Moreover, in some

subject guides there is evidence of an effort to draw links across the curriculum by critically analysing the specific nature of the subject. See, for example *DP: Mathematics Applications and Interpretation Guide*.

In the CP, the structure for the development of interdisciplinary learning is very similar to that demonstrated by the DP. The same interdisciplinary subjects (ESS etc.) are options for students, although fewer DP subjects are taken by CP students compared to DP students, due to the differences in curriculum structure. The components of the CP core do not show quite as much as explicit engagement as the DP core components when it comes to making interdisciplinary links across the programme (though the *Reflective Project Guide* and *Personal and Professional Skills Guide* do contain some relevant evidence of embedding interdisciplinarity). Overall, the CP documents analysed here suggest that the programme might be one step closer towards a model of islands of interdisciplinarity rather than interdisciplinarity which suffuses all programme elements.

In summary, the PYP curriculum model demonstrates the most widespread use of interdisciplinarity across the curriculum; the MYP curriculum model also suffuses interdisciplinary learning across all components, though some resources focussed on specific components articulate the emphasis on interdisciplinarity more clearly and extensively than others; the DP demonstrates a slightly more delimited model of interdisciplinarity, though with potential for the core to join-up the interdisciplinary subjects; finally, the CP is one step further towards a model of interdisciplinary learning experiences which can be extracted from the other parts of the curriculum. It is important to note that there is no value judgement attached to the finding that different IB programmes have different approaches to embedding interdisciplinarity in strategic places or across the entire curriculum. The literature review did not find evidence that a curriculum should be *entirely* interdisciplinary, only that the structure of a curriculum should reflect the intended aims of deploying interdisciplinarity (see Section 3.3, above).

EoPP Judgements and the Stated Aims of IB Programmes

A clear finding from the literature review was that the deployment of interdisciplinary learning in a curriculum should reflect the stated aims of that programme. Interdisciplinarity can be used for a wide variety of purposes, and its success should be measured against its capacity to achieve intended goals rather than an abstract measure of how interdisciplinary something is or is not. This is important context for the extraction of findings from the application of the benchmarking tool because programmes with different aims might find different levels of embeddedness judgements acceptable or even desirable.

The relevance of this is evident in some of the EoPP embeddedness judgements presented in section 6. For example, two of the lowest embeddedness judgements in the PYP came in EoPP 13 and EoPP 15. The Low judgement in EoPP 15 – which is related to linking interdisciplinarity to the specific nature of individual disciplines – can be partly attributed to the fact that the PYP's stated aim of a transdisciplinary curriculum naturally leads to a structure which puts less emphasis on teaching the specific nature of individual disciplines. Similarly, EoPP 13 – which concerns linking interdisciplinary assessment to ideas such as disciplinary grounding and critical awareness of how disciplines and interdisciplinarity are interacting – is

also embedded to a Low degree in the PYP for similar reasons. Disciplinary grounding and critical awareness of how interdisciplinarity relates to disciplinarity are not priorities for the PYP's transdisciplinary structure. The Low judgements for the PYP in these areas are not necessarily detractions, therefore, from what the PYP is trying to achieve with its transdisciplinary framework for learning.

Similarly, whereas EoPP 12 – taking interdisciplinary learning into account in the design of assessment – is embedded to a High degree in the PYP and MYP, it is only embedded to a Moderate degree in the DP and a Low degree in the CP. Both the DP and CP are less explicitly interdisciplinary in their aims compared to the PYP and MYP. Indeed, the DP and CP are more directly driven by the need for students to gain specific qualifications which will either enable further study or success in the workplace. As such, assessing interdisciplinarity is a lower priority in those programmes and the lower judgements for EoPP 12 are not necessarily markers of failure to deliver an expected quality in the programme, but a specific choice about what those programmes choose to prioritise.

The intended aims of each IB programme, individually, are thus important context for the embeddedness judgements. The conversation about how to take forward actions based on these judgements should incorporate a reflective discussion of what each programme's stated aims are in relation to interdisciplinarity.

EoPP Judgements and the IB's Organisational Structure

Another important piece of context for the extraction of findings from the application of the benchmarking tool is that the EoPPs are phrased in such a way that they reflect the choices available to a system in which documentation, pedagogy, curriculum content, assessment, staff management, timetabling, and resourcing can all be controlled by the same centralised decision-making entity. This structure is unlikely to exist in reality. Indeed, the structure of the IB Organisation with its sprawling network of World Schools – each with their own national context and expectations – results in a unique framework whereby some of those aforementioned areas can be centrally organised by the IB Organisation, whereas others can only be handled through soft guidance or the provision of flexible options.

One of these areas in which the IB generally facilitates and provides guidance rather than specific regulation is CPD.[445] The IB's *Programme Standards and Practices* do state that schools must comply "with IB-mandated professional development requirements, as outlined in IB documentation", however, detail of exactly what that CPD should be and how long it should last were rarely extensively discussed in audited documents.[446] Another similar issue, which necessitates flexible centralised guidance due to the IB's organisational structure, is school-level timetabling. Because IB World Schools operate in so many different local contexts with different operational expectations and regulations, the IB Organisation cannot centrally mandate a certain number of staff meetings or define what should be discussed by teaching colleagues. Both of these features of the IB's organisational structure should be taken into account when contextualising the EoPP judgements.

---

[445] https://resources.ibo.org/data/g_0_ibres_sur-ir_1910_1a_e.pdf
[446] *Programme Standards and Practices*, p. 9.

Document Updates and Direction of Travel

Appendix 1 provides a detailed analysis of a small selection of newly updated IB resources and discusses the potential impact that these updates could have if the benchmarking tool were reapplied using these resources in place of their older counterparts. Appendix 1 is not a reapplication of the benchmarking tool, with its fully contextualised judgements based on the presence of evidence across a wide range of resources, but it does provide some information on the potential direction of travel when IB resources are being updated. All new resources examined showed some higher level of either detail or clarity in relation to their discussion of interdisciplinary learning, when compared to the older versions of the same documents. The full details of the potential impact of these newer resources on EoPP judgements and the report's Considerations can be found in Appendix 1.

7.3 Considerations

The following matrix table provides an overview of which programmes and which review themes are relevant to each of the 15 considerations. Blue highlighting indicates where a consideration has programme or theme relevance. This is intended to support stakeholders to identify, at a glance, which considerations are relevant to their programme or theme of interest.

Table 11: Summary of Considerations by Programme/Theme

Consideration Number	PYP	MYP	DP	CP	Documentation Revisions	Assessment	CPD
1	■	■	■	■	■		
2	■	■	■	■	■		
3	■	■	■	■		■	
4	■	■	■	■	■		
5	■	■	■	■			■
6	■	■	■	■	■		
7			■	■	■		
8			■	■	■		
9			■	■	■		
10		■	■	■	■		
11	■				■		
12				■	■		
13			■		■		
14		■			■		
15	■				■		

Consideration 1: To deliver more consistency with the definitions of interdisciplinarity, and the family of related terms, between programmes. A definitional glossary in a cross-programme document (such as *What is an IB Education?*) could provide useful framing – Ecctis' research found that cross-programme documentation does not contain definitions of "interdisciplinarity" or the family of related terms. Moreover, the IB Resources Overview and the benchmarking tool found that the clarity and detail of definitions varies considerably between documents and between programmes. Whereas some documents contain clearly labelled definitions of relevant keywords, others require definitions to be pieced-together from descriptive passages or contain no definition at all. Generally speaking, the PYP and MYP were found to contain clearer and more detailed definitions of relevant terms compared to the DP and CP. Although the PYP and MYP explicitly prioritise subject integration to a higher degree than the DP and CP, those latter programmes would still benefit from further clarity and further detail in how stakeholders are expected to understand and use words and ideas such as "interdisciplinary". If well-flagged and appropriately detailed definitions were placed in a cross-programme document such as *WIAIBE?*, this would raise the standard of definitions in the DP and CP as well as helping staff who may work across multiple IB programmes to experience greater consistency.

    Consideration stems from: EoPP 1 and 2 and section 4.8.

    Relevant IB resources not included in audit: see Appendix 1 for the potential impact of newly updated resources.

Consideration 2: A cross-programme resource could be developed which explicitly describes some of the challenges that are most likely to obstruct effective interdisciplinary learning. This resource could focus on suggesting promising mitigation strategies which could be applied across-programmes by teachers and schools – The literature review of this report identified a number of hurdles that successful implementation of interdisciplinary learning can face for any age group in K-12. In order to help school staff to identify these challenges and implement mitigation strategies, the IB could develop and publish a cross-programme, single-topic resource. The template for this type of resource already exists in the IB's Programme Resource Centre (for example, the recent publication on *Why Wellbeing Matters During a Time of Crisis*, 2020). The findings of EoPP 9 and the research contained in section 3.5 of this report could form a foundation for this new resource.

   Consideration stems from: EoPP 9.

Consideration 3: To consider, in depth, the place of interdisciplinarity in the assessment practices of all programmes. This consideration should focus on how each programme might articulate its top-level interpretation of how interdisciplinarity interacts with assessment in the programme as a whole. This does not mean that interdisciplinarity should be a part of all assessment practices in the IB, but where it is an important component it should be recognisable as part of a wider interdisciplinary learning strategy – This consideration could be enacted through another research project. Interdisciplinarity appears in the IB's assessment practices in a scattered manner, being a key element in some areas and being absent in others. This consideration does not suggest that interdisciplinarity should be embedded into all components of IB assessment, but that the IB should further explore where interdisciplinarity emerges (by design and/or organically) in its assessment practices. A fuller understanding of how interdisciplinarity currently emerges in IB assessment, and how it takes many different forms, would subsequently enable a deliberate interdisciplinary assessment strategy to be articulated (see consideration 4). Detailed analysis of past exam papers and student response samples could form a valuable component of actioning this consideration.

   Consideration stems from: EoPP 12.

Consideration 4: Following consideration 3; to articulate in a new or existing cross-programme resource – which can be explicitly cross-referenced in subject guides and TSMs – the principles which link assessment to interdisciplinary learning in the IB (whether those principles vary from programme to programme, or if they do not) – When the IB has fully explored how interdisciplinarity emerges as both a designed and an organic element of assessment in its programmes, it will be possible to articulate the links between interdisciplinary assessment and other aspects of IB curriculum structure and pedagogy. Currently, links between interdisciplinary assessment and other aspects of interdisciplinary best-practice are articulated only sporadically across programmes. A new or updated cross-programme document would enable the purpose and benefits of interdisciplinarity to be articulated in relation to the IB's assessment practices. A cross-programme resource would still provide enough flexibility to describe how different IB programmes use interdisciplinary assessment for varying purposes according to their structures and different priorities.

   Consideration stems from: EoPP 13.

Consideration 5: CPD that directly addresses interdisciplinary learning and is shaped by the EoPPs highlighted in this report should be highly recommended for all IB teachers – From the resources included in the application of the benchmarking tool it was evident that there is

scope to recommend more explicitly that all IB World School teachers should engage in ongoing professional development which enables them to further develop skills and strategies to successfully embed interdisciplinary learning.

> **Consideration stems from**: EoPP 16.

> **Relevant IB resources not included in audit**: Ecctis did not examine any IB CPD materials in this benchmarking. It is evident that some of the online and face-to-face CPD sessions offered by the IB Organisation do have relevance to this consideration. Examples include the "Beyond the Disciplines" nano PD and webinar.[447] Moreover, an example of a type of document which speaks to this consideration is *MYP: Interdisciplinary Inquiry Resources – Guidance Document* (2020).

Consideration 6: In all programme FPIPs it should be clearly articulated that staff meeting time should be set aside purely for the development of more effective interdisciplinary learning – In order for interdisciplinary learning to be embedded successfully into curricula, it is essential that teachers are enabled to spend dedicated time on collaborating with one another around the design of interdisciplinary units, deployment of interdisciplinary assessment, and development of interdisciplinary teaching strategies. Although the IB Organisation may be unable to mandate specific aspects of timetabling in its World Schools, the programme FPIPs provide an opportunity to unequivocally state that time for interdisciplinary collaboration among staff should be a timetabling priority for schools.

> **Considerations stems from**: EoPP 18.

> **Relevant IB resources not included in audit**: Though not in the programme FPIP as consideration 6 suggests, there is some relevant information and an example of how timetabling might enable transdisciplinarity in the PYP in *PYP: Flexibility in the Programme of Inquiry*.

Consideration 7: To provide more details in DP and CP documentation regarding the definition of interdisciplinary learning, and to ensure that the definition is placed within the context of how integration is intended to take place in those programmes – Consideration 1 already suggests the development of cross-programme content which delivers more detailed and clear definitions of interdisciplinarity (and related terms) for all IB programmes. However, as well as this cross-programme aspect, the benchmarking tool also revealed clear potential in the DP and CP FPIPs (as well as in other strategic places within DP and CP resources) to engage more explicitly with the relationship between the definitions of these keywords and the purpose of integration in those programmes. This was achieved more effectively in the PYP and MYP FPIPs due in part to the detailed subsections which explicitly handle this topic.

> **Consideration stems from**: EoPP 1.

> **Relevant IB resources not included in audit**: see Appendix 1 for the potential impact of newly updated resources.

Consideration 8: To deliver more consistency and clarity in DP and CP documentation regarding the use of the family of terms around "interdisciplinarity", including "multidisciplinarity" and "transdisciplinarity" – As DP and CP resources are gradually updated there is an opportunity to reform the use of keywords in the family of terms related to "interdisciplinarity" and to bring their use strictly into line with the definitions developed as parts of considerations 1 and 7. The findings of EoPP 2, the content of section 3.1, and the analysis

---

[447] https://www.ibo.org/professional-development/free-learning/cross-programme-pd-resources/.

in section 4.7 can be used as foundational guidelines to ensure that use of these terms is consistent and keywords do not appear interchangeably or without considered context.

> **Consideration stems from**: EoPP 2.

Consideration 9: To provide more detail in DP and CP resources about the value and benefits of interdisciplinary learning – The PYP and MYP documentation examined in the benchmarking tool demonstrated more attention to the value and benefits of interdisciplinary learning, but there was clear scope to expand discussion of this in strategic places within DP and CP documentation. For example, the section on "conceptual understanding" found towards the end of *DP: FPIP* and *CP: FPIP* contains some relevant material on the benefits of interdisciplinary learning, but does not flag this with appropriate use of the language of "interdisciplinarity" and the family of related terms.

> **Consideration stems from**: EoPP 5.
>
> **Relevant IB resources not included in audit**: see Appendix 1 for the potential impact of newly updated resources.

Consideration 10: To explicitly recommend the use of multimodal sources to develop interdisciplinarity, and to provide more detail on this practice in MYP, DP, and CP documentation – Ecctis found evidence in the literature review that the use of multimodal sources is an effective method to organically develop student-led interdisciplinary learning. The PYP contains resources which explicitly discuss this promising practice and link it to interdisciplinary learning, whereas the MYP, DP, and CP show scope to further embed discussion of multimodality and its benefits. High-level programme documentation such as the FPIP may be an appropriate location to situate this new content. In addition, it could also be placed in relevant subject guides and TSMs where there is an opportunity to articulate the links between multimodality's fostering of interdisciplinary learning and the specific nature of subject content in the curriculum.

> **Consideration stems from**: EoPP 8.
>
> **Relevant IB documentation not included in audit**: relevant information on use of multimodal sources can be found in the video resource "Multimodality and interdisciplinarity in language A (video)" and in the subsection "Modes of learning and teaching: connections with IB philosophy" in the 2020 document *CP: Navigating Changing Times in the Career-Related Programme*. See Appendix 1 for the potential impact of newly updated resources.

Consideration 11: To provide additional detail on how the disciplinary content in PYP subject areas can be delivered within the programme's transdisciplinary framework, with specific reference to how individual subject areas may need tailored approaches to be effectively developed within an integrated curriculum – The nature of the PYP's transdisciplinary curriculum is such as that (in the documents examined by Ecctis) the individual nature of specific subjects was rarely a feature of the wider discussion of integrated learning. Although transdisciplinarity is the PYP's priority, the promising practice identified in the literature review nonetheless suggests that the individual nature of disciplines should always be a consideration when establishing how best to develop integrated understandings. Although other PYP documentation (not included in the benchmarking tool) might provide some of this detail that Ecctis did not find in the audited resources, there is scope to indicate the location and nature of this content more explicitly in *PYP: FPIP*.

> **Consideration stems from**: EoPP 14 and 15.

> **Relevant IB documentation not included in audit**: The *Scope and Sequence* documents for each of the different subject areas covered by the PYP curriculum contains information about how the content is delivered through concepts and "learning continuums".

Consideration 12: To describe the links between transferable professional skills and interdisciplinarity more explicitly in CP documentation. This explanation would help the CP to demonstrate a clearer framework for how individual curriculum components, including the core and Career-Related Study, can be seen as interlinked through a form of interdisciplinarity – The CP received the overall lowest levels of embeddedness scores compared to the other IB programmes, however there is scope to increase the CP's embeddedness of interdisciplinary learning without significantly altering curriculum content if the core and Career-Related Study were explicitly linked to interdisciplinary learning. Through the development of transferable skills (see section 3.7) there is a strong case to be made for the fact that CP curriculum components that all students undertake – such as Personal and Professional Skills and the Career-Related Study – are linked to interdisciplinarity. These links have the potential to be explored in more detail and then to be articulated more explicitly in CP documentation.

> **Consideration stems from**: EoPP 15.
> **Relevant IB documentation not included in audit**: There is some information relevant to this consideration in *CP: Personal and Professional Skills TSM*.

Consideration 13: To make the "Conceptual Understanding" subsections found towards the end of both the DP and CP FPIPs describe interdisciplinarity and subject integration more explicitly, building on the existing discussion of how both programmes use concepts – These almost identical subsections found in the DP and CP FPIPs provide a clear opportunity to link conceptual understanding to interdisciplinarity in a way that directly addresses how interdisciplinarity is designed to function within and across curriculum components in those programmes. Some of the relevant content is already in place in that subsection, but explicit links to interdisciplinarity could be further embedded in order to provide a clear explanation of the interaction between the DP/CP pedagogic approach and interdisciplinary learning.

> **Consideration stems from**: EoPP 4.

Consideration 14: To embed further explicit discussion of interdisciplinary learning into *MYP: Projects Guide* as this part of the curriculum is an important source of MYP interdisciplinarity, but currently has clear scope for more dedicated explanation of its relevance to interdisciplinary learning – The analysis of *MYP: Projects Guide* in the benchmarking process found that the idea of interdisciplinarity was clearly a structural part of both the community and personal projects, and this part of the MYP was one of the strongest examples of project-based learning being used to enable interdisciplinarity in the programme. However, explicit use of terms such as "interdisciplinary learning" are almost entirely absent from the resource. There is thus scope to further embed the language of interdisciplinarity into this document when it is updated, thereby enabling the MYP projects to stand out as powerful sources of interdisciplinarity in the MYP.

> **Consideration stems from**: EoPP 6.

Consideration 15: To provide further detail in *PYP: FPIP – The Learning Community* regarding how teachers could be empowered to respond to topics of current interest and new research developments in order to shape the transdisciplinary content in their lessons – The

flexibility of the transdisciplinary curriculum in the PYP is articulated in a number of locations and has a particularly strong emphasis on responding to students' interests. However, there is scope in the programme's FPIP to add some further emphasis on the fact that teachers could use the PYP's curriculum flexibility to incorporate new and emerging research or topics which are capturing mainstream attention. Section 3.4 of the literature review suggested that flexibility of this type can be an important tool because it enables teachers to organically develop interdisciplinarity which is responsive to the fact that real-world research and developments emerge out of interdisciplinarity. This benefit of the PYP's curriculum flexibility could be stated more explicitly to further embed the identified promising practice.

Consideration stems from: EoPP 7.

Appendix 1 – New Documentation

Following the initial draft of the EoPP judgements, a small selection of new documentation was highlighted by the IB which is shortly due to replace some resources analysed in the benchmarking. It was agreed between the IB and Ecctis that rather than beginning the benchmarking again with a new selection of documents, this appendix would be used to compare the new resources with their older equivalents, and analyse the impact that these new resources would be likely to have on the existing benchmarking judgements. This section is therefore intended to not only analyse the new documents but also provide added value by enabling a comparison between older resources and newer resources, reflecting on the direction of travel (in relation to embeddedness of interdisciplinary learning) when resources are updated. This information is taken into account in Section 7 (Conclusions and Considerations), where the discussion considers the changes and developments set in motion by these updates.

MYP: Interdisciplinary Teaching and Learning in the MYP

Overview of Document Changes

The new resource examined by Ecctis is designed as a direct replacement for *MYP: Fostering Interdisciplinary Teaching and Learning in the MYP*. As a result, it is possible to directly compare some of the similarities and differences (related to interdisciplinary learning):

Table 12: Overview Comparison of Old/New MYP Resource

	MYP: Fostering Interdisciplinary Teaching and Learning in the MYP – for use from September 2014/January 2015 (published 2014, updated 2017)	MYP: Interdisciplinary Teaching and Learning in the MYP – for use from August 2021/January 22 (published 2021)
Pages	70	72
Substantive Sections	Foreword; Introduction; Interdisciplinary Teaching and Learning in the MYP; Planning Interdisciplinary Learning; Teaching Interdisciplinary Units; Assessing Interdisciplinary Units; Appendices	Foreword; Introduction; Interdisciplinary Teaching and Learning in the MYP; Planning Interdisciplinary Learning; Delivering Interdisciplinary Units; Assessing Interdisciplinary Units; Appendices; FAQs; Bibliography
Subsection exclusively about interdisciplinarity	Yes	Yes
Relevant keywords	"interdisciplinary" x 498 "interdisciplinarity" x 2 "multidisciplinar(it)y" x 6 "transdisciplinar(it)y" x 17 "concept(s)(ual)" x 113 "integrat(e)(ed)(ion)(ive) x 77	"interdisciplinary" x 571 "interdisciplinarity" x 8 "multidisciplinar(it)y" x 5 "transdisciplinar(it)y" x 15 "concept(s)(ual)" x 130 "integrat(e)(ed)(ion)(ive) x 116

As this table clearly shows, there are many areas of similarities between the old and new resources. Both are approximately the same length, include many of the same substantive sections, and both feature the keyword language of interdisciplinarity to a high degree (though with slightly different emphases).

However, there are also a number of changes introduced by the new resource. Many of these are tweaks and edits at the sentence and paragraph level, but there are also some more substantial revisions. There are too many to describe these fully, but they include examples such as:

- Generally adding detail in many subsections; for instance, new details on the benefits of interdisciplinarity to schools (in addition to the existing list of benefits to students and teachers);
- A table linking interdisciplinarity to areas of programme development, practices, developmental questions, and indicators of highly developed practice;
- Altering the section on "Teaching Interdisciplinary Units", to become "Delivering Interdisciplinary Units";
- A new subsection offering "Guidance for teachers new to MYP interdisciplinary learning";
- Updated assessment criteria in a new structure;
- A new FAQs section.

Potential Impact on EoPP Judgements[448]

EoPP 8: To encourage the use of a wide variety of multimodal sources, enabling students to build their own links between disciplines and explore knowledge areas.
No impact.

EoPP 9: To show proactive engagement with the key challenges which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning.
The key reason that the MYP embeddedness judgement for EoPP 9 was finalised at Moderate rather than High was a result of the fact that there was a lack of detail and emphasis in MYP documents on the need for staff to have interdisciplinarity-focused CPD. Although the new resource does not contain particularly large amounts of detail regarding CPD, and would therefore be unlikely to elevate the current judgement, the new subsection providing "Guidance for teachers new to MYP interdisciplinary learning" does demonstrate some movement in the direction of the promising practice. That section explains that

> "Teachers new to the MYP programme or MYP interdisciplinary units require support to develop an understanding of the interdisciplinary learning process, disciplinary learning processes, disciplinary formative or summative assessments, and the connections between these fundamental processes".

Moreover, in the same paragraph, it is stated that:

---

[448] Only those EoPP judgements which fell below High Embeddedness in the Benchmarking Tool are discussed here.

"specific professional development opportunities related to interdisciplinary planning and the presence of interdisciplinary coordinators ensure a higher level of teacher understanding, making interdisciplinary units a priority for the school". [449]

This is part of a general emphasis in this subsection on how professional development is likely to be needed for teachers who have not taught MYP interdisciplinarity before. Although this may not be sufficient to elevate the embeddedness judgement on its own, this would definitely provide substantial contribution to a move in that direction.

EoPP 16: To provide continuing professional development opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies.
See discussion around EoPP 9, above.

EoPP 18: To put time aside in the curriculum which is explicitly for teachers to reflect and collaborate around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity.
As with EoPP 9 and 16, the new subsection on "Guidance for teachers new to MYP interdisciplinary learning" has something to contribute to the evidence relevant to this promising practice. That new content recognises that "limited collaborative planning time is the most frequently reported barrier to more integrated interdisciplinary units". As a response to this, the new document recommends that:

"Discussing the probing questions included in each section of the example unit plan during collaborative planning time will help new teachers to deepen their understanding of the interdisciplinary learning process; brainstorm possible ideas for the key concept, related concept(s), global context, and exploration that can structure the interdisciplinary unit; and develop authentic and meaningful summative task(s)".

The new document does therefore provide some additional focus on the need for time to be put aside explicitly to address interdisciplinarity. There is likely to be still more focus and detail needed to raise the embeddedness judgement to High, but this evidence goes a good distance towards elevating the current judgement.

DP: Literature and Performance Guide

Overview of Document Changes

Because the new resource is a direct like-for-like replacement for the older *DP: Literature and Performance Guide*, it is valuable to carry out comparisons on specific characteristics related to interdisciplinary learning. This is represented in the table below:

---

[449] *MYP: Interdisciplinary Teaching and Learning in the MYP* – for use from 2021/2022, p. 38.

Table 13: Overview Comparison of Old/New DP Resource

	DP: Literature and Performance Guide – first examinations 2015 (published 2011, updated 2013)	DP: Literature and Performance Guide – first assessment 2024 (published 2022)
Pages	42	62
Substantive Sections	Introduction; Syllabus; Assessment; Appendices	Introduction; Syllabus; Assessment; Approaches to teaching and approaches to learning; Appendices
Subsection exclusively about interdisciplinarity	No	Yes
Relevant keywords	"interdisciplinary" x 5 "concept(s)" x 7 "integrat(e)(ed)(ion) x 2	"interdisciplinary" x 17 "interdisciplinarity" x 3 "concept(s)" x 40 "conceptual(ly)" x 6 "integrat(e)(ed)(ion)" x 6

As the table above demonstrates, the newer Literature and Performance document contains substantially more focus on interdisciplinarity compared to the older document (according to this selection of measures). As well as being longer (and therefore containing more opportunity to discuss interdisciplinary learning), the keyword data shows that the language of interdisciplinarity is infused into this document to a far higher degree.

Perhaps the most significant single addition to the newer document (in relation to interdisciplinary learning) is the subsection within "Nature of the Subject" named "Interdisciplinarity in literature and performance". This does not exist in the older resource and – though less than a page in length – contains substantial content explicitly concerning interdisciplinarity in this subject.

It begins with the following paragraph:

> "In the DP, interdisciplinary learning is the process by which students come to explore the nature and methodologies of two or more disciplines or subject groups to understand how their integration can create new and/or deeper understanding. Students demonstrate interdisciplinary understanding when they can integrate concepts, methods or forms of communication from two or more disciplines or established areas of expertise to explain a phenomenon, solve a problem, create a product, or raise a new question in ways that would have been unlikely through a single discipline. (Boix-Mansilla, 2010)".[450]

This statement provides an effective definition of interdisciplinary learning in the DP while also linking to some of the benefits of integration. The rest of the subsection goes on to explain how Literature and Performance links individual disciplines through student-led synthesis, in

---

[450] *DP: Literature and Performance Guide* – first assessment 2024, p. 7.

order to provide different or deeper understandings. Particular emphasis is placed on the fact that students will develop the skill of synthesis when seeking to understanding how a text is transferred to the stage. This subsection is concluded with a Venn-diagram-like representation of how two different disciplinary perspectives can overlap to build up interdisciplinary understanding.

Elsewhere in the new document, it is also important to note the newly designed course structure which is now built around three areas of exploration and seven central concepts. Not only would the potential for interdisciplinarity likely be evident to the reader of this new structure, it is also explicitly stated: "In this course, the areas of exploration support an interdisciplinary approach to the study of literature and performance and the synthesis of the two".[451] Moreover, the interdisciplinarity of this redesigned structure is also supported with the new "learning processes" flagged by the document:

> "As an interdisciplinary course, literature and performance is grounded in three interconnected learning processes: engaging with literary texts, analysing and performing dramatic texts, and transforming non-dramatic literary texts into performance. These learning processes should be considered when designing the course, alongside the areas of exploration and the central concepts".[452]

Finally, the new document also flags interdisciplinarity more explicitly in relation to the subject's interaction with the Approaches to Teaching and Approaches to Learning, and it provides more information on how interdisciplinary learning features in the subject's assessment practices:

> "The internal assessment component embodies the interdisciplinary nature of the course. Transforming non-dramatic texts into performance requires students to synthesize knowledge and understanding of both literary and theatrical disciplines, creating a new understanding that could not be achieved through each discipline alone".[453]

Potential Impact on EoPP Judgements

EoPP 1: To deliver a coherent, research-informed definition of interdisciplinary learning, which is guided by the intended purpose of deploying interdisciplinarity.
Both the DP and CP judgements for EoPP 1 were finalised at Low. This was a result of the fact that although some definitional work for the term "interdisciplinary" did exist in relevant documentation, there was no centralised definition, and where definitional work was being done it lacked detailed links to purpose or research-basis. As subject documentation, this new *Literature and Performance Guide* cannot provide that centralised definition that EoPP 1 requires for High embeddedness, however, it does provide more definitional clarity on interdisciplinary learning than any other DP or CP resource explored in the audit outside of *DP: Extended Essay Guide*. Because the new definitional work done in this document does contain some links to the intended purpose of integration (in the DP, at least), this resource

---

[451] DP: Literature and Performance Guide – first assessment 2024, p. 19.
[452] DP: Literature and Performance Guide – first assessment 2024, p. 20.
[453] DP: Literature and Performance Guide – first assessment 2024, p. 43.

would likely raise the EoPP 1 score for the DP to Moderate. Because the links to integration's purpose are not made to the CP in this document, and because (without the *Extended Essay Guide*) the CP's embeddedness judgement was already comparatively lower than the DP's, the CP's Low judgement would not likely be raised by this document.

EoPP 2: To engage clearly and coherently with the differences and similarities between interdisciplinarity and other related terms such as multidisciplinarity and transdisciplinarity.
No impact.

EoPP 5: To clearly articulate and communicate, to staff and students, the value and benefits of interdisciplinary learning.
There is some explanation in this new resource of the value and benefits of interdisciplinarity learning in gaining new perspectives on an integrated subject area. The value of applying synthesis skills across multiple disciplines is particularly clearly highlighted. This evidence would not likely be enough to raise either the DP or CP judgement from Moderate to High, but it does provide some valuable contribution which (if replicated across other subject documents as well) would potentially enable both programmes to move up the judgement scale for this EoPP.

EoPP 8: To encourage the use of a wide variety of multimodal sources, enabling students to build their own links between disciplines and explore knowledge areas.
The nature of the Literature and Performance subject structure was already being used in the judgements of Moderate in the DP and CP. Although the new guide, a longer document, contains some more detail on the potential multimodality involved in this subject, it is not a substantial change that would likely to lead to a change in the embeddedness judgements.

EoPP 9: To show proactive engagement with the key challenges which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning.
No impact.

EoPP 12: To take interdisciplinary learning into account in the design of assessment.
Although the new resource contains more detail than the older document concerning how interdisciplinarity has been taken account of in design of assessment in DP Literature and Performance, this is unlikely to be sufficient evidence to bring the judgement above the current level of Moderate. An increase in that judgement would need more programme-level attention in a centralised location like *DP: FPIP*. However, the new resource also applies to the CP, and has a higher likelihood of raising the embeddedness judgement from Low to Moderate. The current CP judgement also needs more detailed centralised statements about interdisciplinarity and assessment of the programme in general, but the added detail provided in this new subject resource provides valuable additional evidence of scattered embeddedness of EoPP 12.

EoPP 13: To link interdisciplinary assessment with conceptual understanding, disciplinary grounding, advancement through integration, and critical awareness.
The embeddedness judgement for EoPP 13 in the DP is already High, but the new document does show some potential of raising the CP's embeddedness judgement from Moderate to High. The new resource demonstrates considerably more engagement than the older document with how assessment in Literature and Performance would be linked to conceptual

understanding, disciplinary grounding, advancement through integration, and critical awareness of how interdisciplinarity is being used. As a result, this could raise the embeddedness judgement from Moderate to High in the CP.

EoPP 15: To embed interdisciplinary learning into the curriculum in a manner that takes into account the intrinsic and individual nature of specific disciplines.

This new resource contains some evidence of embeddedness of EoPP 15 in the CP, as it does contain a more detailed engagement with the fact that this interdisciplinary subject combines the inherent natures of two specific disciplines. However, for the embeddedness judgement of EoPP 15 in the CP to be raised from Moderate to High, it would probably be necessary for the programme core or another compulsory element of the programme to demonstrate some further level of embeddedness. As this cannot be satisfied by this new subject documentation, the impact would not be likely to raise the current judgement.

EoPP 16: To provide continuing professional development opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies.

No impact.

EoPP 18: To put time aside in the curriculum which is explicitly for teachers to reflect and collaborate around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity.

No impact.

DP: The Interdisciplinary Extended Essay Pathway

Overview of Document Changes

The new resource examined by Ecctis is not a direct like-for-like replacement for an older document. Instead, it is a draft section of a redesigned Extended Essay guide which will use a new structure for this part of the DP core. The existing distinction for students is between choosing to carry out a subject-specific Extended Essay and an interdisciplinary Extended Essay (which could be in Literature and Performance, Environmental Systems and Societies, or could be the World Studies Extended Essay). In the redesign, the distinction will simply be between a subject-specific essay (subject-focused pathway) and the interdisciplinary pathway. The new resource that Ecctis has analysed for this appendix is the draft content describing the nature of the interdisciplinary Extended Essay pathway. The document received by Ecctis was not a final, published version but a draft containing some sections with incomplete content.

The new resource includes content related to the definition of what interdisciplinarity means in relation to the Extended Essay. This is supplemented by a discussion of the value and benefits of interdisciplinary learning and an explanation of how individual subjects should be used and fused in order to develop a project on the interdisciplinary Extended Essay pathway. More information is also given on how an interdisciplinary topic might be chosen, and how it should reflect a student's interests. The new material concludes with some discussion of how interdisciplinarity interacts with the Extended Essay assessment criteria.

As the document examined by Ecctis was incomplete and in draft form, it is not possible to give concrete decisions on how the new document would be likely to alter EoPP judgements. However, it is possible to explain where it appears that new content would at least *make a contribution* that has the potential to impact EoPP judgements.

EoPP 1: To deliver a coherent, research-informed definition of interdisciplinary learning, which is guided by the intended purpose of deploying interdisciplinarity.
The new resource demonstrates more engagement with the definition and purpose of interdisciplinarity than any of the DP-specific resources analysed in the benchmarking. The subheading "What does 'interdisciplinary' mean in the extended essay?" clearly flags the subsequent definitional work and, throughout the new content, there are links between this interpretation of what interdisciplinary means and how it has a clear purpose in the Extended Essay. Although the definitional work being demonstrated here is highlighted as being specific to the Extended Essay, there is clearly content here which would be likely to contribute towards an increase in the DP's Low embeddedness judgement for EoPP 1.

EoPP 2: To engage clearly and coherently with the differences and similarities between interdisciplinarity and other related terms such as multidisciplinarity and transdisciplinarity.
No impact.

EoPP 5: To clearly articulate and communicate, to staff and students, the value and benefits of interdisciplinary learning.
The new resource provides more detail on the value and benefits of interdisciplinary learning than many other resources included in the benchmarking. The Moderate embeddedness judgement for EoPP 5 in the DP would be improved by well-flagged and more detailed discussion of the value and benefits of interdisciplinary learning, especially in a centralised document such as *DP: FPIP*. Although the new material could not satisfy all of these requirements, the additional and well-flagged detail provided by the draft content clearly demonstrates the potential to contribute to a raising of the current embeddedness judgement.

EoPP 8: To encourage the use of a wide variety of multimodal sources, enabling students to build their own links between disciplines and explore knowledge areas.
The examples of interdisciplinary essays provided in the new resource content does not explicitly mention multimodal sources, but multimodality is implied by the nature of some of the examples. On its own, this would not be likely to raise the embeddedness judgement above Moderate, but it could contribute to an improved judgement with more explicit discussion of multimodality injected elsewhere.

EoPP 9: To show proactive engagement with the key challenges which frequently cause a disconnect between the theory and the practice of developing interdisciplinary learning.
The explanation in the new resource of how integration can be developed by students as a gradual process, and how two subjects can be blended strategically (rather than all at once), could be an effective contributor to wider discussions of strategies which mitigate the challenges to effective interdisciplinary learning. On its own, this new content would not be

likely to raise the embeddedness judgement from Moderate to High, but it shows potential to be a contributing factor in the context of wider reforms to DP documentation.

EoPP 12: To take interdisciplinary learning into account in the design of assessment.
Although the new content shows effective engagement with the need to embed interdisciplinarity into the design of assessment, the existing *DP: Extended Essay Guide* was already demonstrating this effectively too (in relation to the World Studies Extended Essay). The Moderate judgement for EoPP 12 in the DP is not therefore likely to be raised by the new material, despite the fact that it does engage effectively with the promising practice, because changes are needed in places other than the Extended Essay guide in order for that judgement to be improved.

EoPP 16: To provide continuing professional development opportunities for teachers to learn about potential interdisciplinary content and refine effective pedagogies.
No impact.

EoPP 18: To put time aside in the curriculum which is explicitly for teachers to reflect and collaborate around interdisciplinarity, developing innovative methods, building understanding of content areas, and cultivating enthusiasm of interdisciplinarity.
No impact.

Trends in Document Updates – Direction of Travel

Overview of Impact on EoPP Judgements

Overall, the trend among these new documents is that they contain more focus or more detail on issues surrounding the embedding of interdisciplinary learning. As is demonstrated above, not all EoPP judgements would be likely to be raised by these new resources (if they were included in a fresh benchmarking exercise). However, there are some areas where new documentation does include evidence that would have the potential to improve some current embeddedness judgements which fall below High. Indeed, all three new resources analysed in this appendix contain new material that shows clear potential to raise embeddedness judgements in the MYP, DP, or CP.

As this subsequent analysis has not been part of a full benchmarking exercise, it is not possible to say precisely what a new resource would alter in the existing EoPP judgements. However, the direction of travel indicated by these resources is that of discussing interdisciplinary learning in more detail and with additional clarity. If this direction of travel were continued as a trend, it would be likely that a future benchmarking study would find improved EoPP judgements in some areas.

Overview of Impact on Considerations

Because these resources were not examined as part of the benchmarking exercise, the findings of this appendix are not used to directly inform the considerations in the body of the report. However, the direction of travel indicated by the analysis in this appendix can be used to make some general statements about how these updated resources could, *potentially*, have an impact on the considerations.

Four of the considerations listed in section 7.2 would have the potential to be influenced by these updated resources. In no cases would the consideration itself be directly altered, but the starting position from which the IB could consider making changes would be moved closer to the considerations' goals. The considerations in question are:

Consideration 1: To deliver more consistency with the definitions of interdisciplinarity, and the family of related terms, between programmes. A definitional glossary in a cross-programme document (such as *What is an IB Education?*) could provide useful framing

> Although the new documents do not supply the single centralised glossary that is described in consideration 1, the definitional work and consistency around some of the key terms is clearer in some of these resources compared to their older counterparts. The consideration would not likely be altered, because more consistency and centralised definitions would continue to be valuable.

Consideration 7: To provide more details in DP and CP documentation regarding the definition of interdisciplinary learning, and to ensure that the definition is placed within contextual information regarding how integration is intended to take place in those programmes

> The direction of travel indicated by the DP/CP-relevant resources analysed in this appendix suggest that document updates may already be putting consideration 7 into action. However, it would still be important to keep it in place as a consideration to ensure that future document updates continue to develop clarity improvements in this area.

Consideration 9: To provide more detail in DP and CP resources about the value and benefits of interdisciplinary learning

> Some of the new resources analysed in this appendix indicate that document updates in the DP/CP may already be offering gradually more emphasis on the value and benefits of interdisciplinary learning. If this trend were continued across a wider range of documents, then the need for the consideration would reduce.

Consideration 10: To explicitly recommend the use of multimodal sources to develop interdisciplinarity, and to provide more detail on this practice in MYP, DP, and CP documentation

> The new *DP: Literature and Performance Guide* and the new Extended Essay interdisciplinary pathway content both show some evidence for improved or more detailed explicit or implicit discussion of use of multimodal sources. On their own, these do not provide sufficient evidence to alter consideration 10, but they do suggest that some DP document updates may already be making changes which move discussion of multimodal sources in the direction of promising practice.

Appendix 2 – Scoping Evidence in Audited Resources

This appendix provides an annotated example of how IB resources included in the audit were scoped for relevant evidence that would inform the EoPP judgements. As discussed in section 5.4, a bespoke and flexible approach was required to carry out analysis that was driven by the unique and variable nature of the 18 EoPPs. Nonetheless, a thorough scoping of each resource is at the heart of this flexible method, and this appendix demonstrates the simple approach to scoping resources for potentially relevant evidence.

Below are copies of the content from MS Excel spreadsheets used to keep track of content within documents which may have links to interdisciplinarity in general or specific EoPPs.

The resources selected to demonstrate this methodology are *What is an IB Education?*, *DP: Theory of Knowledge Guide*, *DP: Mathematics Applications and Interpretation Guide*, and *MYP: Projects Guide*. This selection was made because it provides a broad coverage of elements of programme cores, a cross-programme document, and a subject guide. At the start of each document scoping below, more will be said about the reasons for choosing that resource for this appendix.

The tables list every subsection of each resource and provide brief comments (either copied directly from the resource or summarised by Ecctis analysts) which indicate the type of likely link to interdisciplinary learning. The rightmost column lists the EoPPs which could potentially have their judgements informed by evidence from this subsection. The phrasing of the tables is hedged with terms such as "*Likely* Links" and "EoPPs to *Consider*" because the wider context of programme structure and the content of other resources are important considerations which must be taken into account before anything can be labelled conclusive evidence of EoPP embeddedness.

What is an IB Education?

This short, cross-programme document provides overviews of many of the key curriculum components common to the PYP, MYP, DP, and CP.

Table 14: Scoping Evidence in What is an IB Education?

Section	Subsection	Likely IDL Links	EoPPs to Consider
Introduction	Creating a better world through education	"provide an education that crosses disciplinary, cultural, national and geographical boundaries, and that champions critical engagement, stimulating ideas and meaningful relationships"///////comments on interconnected world understanding being produced by IB ed///////	1, 4, 5
Key Elements of an IB Education	International-Mindedness	comments on interconnectedness and global inquiry///////"collaborate across cultures and disciplines" to create a more peaceful world//////////multilingualism, identity and intercultural understanding////////////	4, 5
	The IB LP	Discuss in full detail in section 4.	
	A broad, balanced, conceptual and connected curriculum	conceptual learning across a whole programme, balance/////////"They promote conceptual learning, create frameworks within which knowledge can be acquired, and focus on powerful organizing ideas that are relevant across subject areas and that help to integrate learning and add coherence to the curriculum."////////////"The programmes emphasize the importance of making connections, exploring the relationships between academic disciplines, and learning about the world in ways that reach beyond the scope of individual subjects. They also focus on offering students authentic opportunities to connect their learning to the world around them."//////programme-by-programme breakdown of how IDL elements are injected, though not always explicit	1, 2, 3, 4, 6, 10, 11
	Approaches to Teaching and Learning	Discuss in full detail in section 4.	
Conclusion	A worldwide community of educators	collaboration between teachers and staff////////different cultures working together/////////world changing needs collaborative approach	4, 7, 17, 18
	Additional Reading	Some relevant texts here, but not linked to IDL in its own right	

The table above shows that this short resource does contain potential links to a significant proportion of the 18 EoPPs. From the numbers which repeat most frequently in the rightmost column of the above table, the document is likely to link to interdisciplinary learning promising practice most consistently through the following ideas:

- EoPP 1 – Developing a purpose-informed definition of interdisciplinary learning,
- EoPP 4 – Interdisciplinarity and its links to constructivist pedagogy,
- EoPP 5 – Articulating the value and benefits of interdisciplinary learning.

However, this quantitative measure of subsections with potential links to EoPPs is a blunt tool compared to the in-context analysis which informs the EoPP judgements. Reading the document closely and looking at its contribution to interdisciplinary learning in the context of other cross-programme and programme-level documents, it is evident that links between interdisciplinary learning and constructivist pedagogy (EoPP 4) are the most significant contribution of this document to the evidence for EoPP embeddedness. Not only do multiple subsections of this document contain potential links to EoPP 4, but *WIAIBE?* also contains full details of the LP, ATT, and ATL, which (as shown in section 4.8 of this report) contain many explicit and implicit links to interdisciplinarity.

DP: Theory of Knowledge Guide

This is a relatively new document with very few direct uses of the family of terms around "interdisciplinarity", but with many references which can be unpicked through a close reading of the details of the document. Moreover, it is a resource with relevance to a very large number of students since it is the main document describing a compulsory part of the DP core.

Table 15: Scoping Evidence in DP: Theory of Knowledge Guide

Section	Subsection	Likely Interdisciplinary Learning Links	EoPPs to Consider
Introduction	About this publication	Reference to collaborating with other teachers using programme communities	17
	About the IB	Overview of intercultural understanding//////////ATL overview/////////Overview of DP structure//////////Overview of core including links with understanding other contexts and the views of others//////////"TOK emphasizes comparisons and connections between areas of knowledge and encourages students to become more aware of their own perspectives and the perspectives of others."////////////"The three strands of CAS are creativity (arts, and other experiences that involve creative thinking), activity (physical exertion contributing to a healthy lifestyle) and service (an unpaid collaborative and reciprocal engagement with the community)."////////////"The extended essay (EE) presents students with an opportunity to explore a topic of special interest, either through one of their six DP subjects or through an interdisciplinary approach."////////////"There should be close links between these core elements and the rest of the DP. It is important that teachers give careful consideration to how TOK, CAS and the EE can feed into a deeper understanding of the academic subjects, as well as how these subjects can enrich the core."	5, 4, 14, 7, 6
Theory of Knowledge	The TOK course "at a glance"	"In TOK, students reflect on the knowledge, beliefs and opinions that they have built up from their years of academic studies and their lives outside the classroom"///////////Overview of TOK themes and areas of knowledge, many of which likely to be ID//////////TOK assessments described with overview/////////teachers encourages to use diverse examples to support student interests etc.	1, 3, 4, 6, 7, 12
	Nature of the Subject	"TOK underpins and helps to unite the subjects that students encounter in the rest of their DP studies. It engages students in explicit reflection on how knowledge is arrived at in different disciplines and areas of knowledge, on what these areas have in common and the differences between them. It is intended that through this holistic approach, discussions in one area will help to enrich and deepen discussions in other areas."//////////"The course is an opportunity for teachers and students to engage in interesting conversations that cross the boundaries of individual disciplines and that help students to reflect on the knowledge they have acquired from both their academic studies and their lives outside the classroom."//////////"They explore different methods and tools of inquiry and try to establish what it is about them that makes them effective, as well as considering their limitations."//////////Overview of 12 concepts used and how they facilitate transfer of knowledge//////////Overview of how TOK supports I-M though seeing through cultural perspectives//////////Emphasis on dialogue and reflection	14, 15, 4, 3, 10, 5

Section	Subsection	Likely Interdisciplinary Learning Links	EoPPs to Consider
	Aims	intercultural understanding, different perspectives and making sense of the world///////////to encourage students to make connections between disciplines through concepts and inquiry	5, 10, 9, 4, 13
	Assessment Objectives	"identify and explore links between knowledge questions and areas of knowledge"/////////perspectives and communication	5, 13
Syllabus	Course Outline	Different disciplines linked through themes and areas of knowledge	4, 13
	Knowledge Questions	"Knowledge questions help students to move beyond subject-specific questions or specific real-life situations into the realm of TOK."///////////// Instead of focusing on subject-specific content or specific examples, students focus on how knowledge is constructed and evaluated. In this sense, knowledge questions are distinct from many of the questions that students encounter in their other subjects.//////////Knowledge questions also draw on TOK concepts and terminology, rather than using subject-specific terminology or specific examples./////////authenticity and IDL linked//////specific examples include single-subject framing and IDL combined/////////emphasis on student-led connections/////////flexibility for teachers is emphasised//////////multiple perspectives opened up by knowledge questions//////////some evidence of needing metacognitive awareness of how to use IDL and disciplines, e.g. "Does what is seen to constitute "good evidence" vary from discipline to discipline and culture to culture? How is knowledge produced and communicated in these themes/areas of knowledge?"//////////centred on the student as knower//////////teachers scaffold around the themes but with flexibility	3, 4, 5, 7, 9, 12, 14, 15
	Optional Themes	themes indicate use of disciplines but also IDL through combination/////////flexible use of concepts and authentic issues//////////inquiry could be IDL through these knowledge questions//////some understanding of unique nature of disciplines	3, 4, 5, 6, 7, 9, 10, 11, 14
	Areas of Knowledge	Use of disciplinary knowledge and combining them through the 5 areas of knowledge that students must study all of/////////////// Crucially, a key focus should then also be on encouraging students to make comparisons and connections across the areas of knowledge.//////////understanding of specific disciplines clearly flagged here//////////some use of "interdisciplines" areas like "the arts"	3, 5, 7, 6, 9, 14, 15
Assessment	Assessment in the DP		
	TOK assessment outline	linking the previous information with the assessment description leads to this being viewable as an aspect of interdisciplinary assessment	12, 13
	TOK assessment details	student interests//////multimodal sources through the objects?//////whole school and learning community engagement implied/////////student-led inquiry into questions which are likely to cross disciplinary boundaries////////teachers help to scaffold	3, 4, 6, 7, 8, 9, 10, 12, 13, 14
	TOK assessment instruments	assessment instrument is quite general, but would allow marker to look holistically for evidence of the IDL priorities established earlier in the document	12, 13
Appendices	Designing a TOK course	flexibility for teachers/////////match interests of students/////////use of disciplinary areas and IDL combined	7, 14, 15

Section	Subsection	Likely Interdisciplinary Learning Links	EoPPs to Consider
	Bibliography		
	Acknowledgme nts		

This table indicates the broad array of EoPPs which may be informed by the evidence from within subsections of this resource. It also demonstrates that many subsections within this resource contains evidence which is likely to be linked to interdisciplinarity in one of many ways. As the comments reveal, these links to interdisciplinarity are not often in the form of directly using a phrase like "interdisciplinary learning", but the context of the EoPPs helps us to identify curriculum content and guidance which would either likely lead to interdisciplinary learning or would at least facilitate the possibility of it being developed.

The links to interdisciplinary learning in *DP: Theory of Knowledge Guide* were found to be frequently centred around the fact that this part of the core asks students to consider the way that knowledge might be created/discussed in specific subject contexts, and then asks them to take that consideration and look more broadly at themes and areas of knowledge which cross between individual subject areas. This attention to how knowledge questions cross between disciplinary boundaries is articulated in relation to the design of TOK, the aims of the course, the assessment of the course, and the examples provided within the resource.

From the numbers which repeat most frequently in the rightmost column of the above table, the document is likely to link to interdisciplinary learning most consistently through the following ideas:
- EoPP 4 – Interdisciplinarity and its links to constructivist pedagogy,
- EoPP 5 – Articulating the value and benefits of interdisciplinary learning,
- EoPP 7 – Curriculum flexibility enabling interdisciplinary learning,
- EoPP 14 – Mutual reinforcement between interdisciplinarity and individual disciplines.

DP: Mathematics Applications and Interpretation Guide

This guide for a new mathematics course in the DP and CP may not use terms such as "interdisciplinary" to a significant extent, but in some of the subsections within this resource there is a clear and sustained engagement with how interdisciplinary learning might take place in the subject or may be enabled by links between the subject and other parts of the curriculum.

Table 16: Scoping Evidence in DP: Mathematics Applications and Interpretation Guide

Section	Subsection	Likely IDL Links	EoPPs to Consider
Introduction	Purpose of this document	thanking contributions from schools implies collaborative approach to curriculum design	17?
	The Diploma Programme	"There is a strong emphasis on encouraging students to develop intercultural understanding, open-mindedness, and the attitudes necessary for them to respect and evaluate a range of points of view"//////////six academic areas////////////enables selection of subjects that reflect student interest and is flexible//////////////choosing 1 from each of the subject areas//////////////both standard and higher level develop critical thinking and analysis//////////description of the core describes TOK as skills, inquiry, and process focussed rather than body of knowledge///////////TOK emphasises connections between areas of knowledge and personal knowledge/////////CAS emphasises weaving together strands to develop identity and intercultural understanding//////////EE is investigation of topic of special interest with potential to choose interdisciplinary option (though with subjects addressed appropriately)//////////EE emphasises personal and authentic learning opportunity//////////discussion of ATT and ATL highlights skill development and developing relevance and coherence of curriculum/////////////"promote both the aims of individual subjects (making them more than course aspirations) and linking previously isolated knowledge (concurrency of learning)"/////////////engages with the fact that DP enables students to gain quals for further study but also develop variety of skills//////////implicit that the ATT and ATL join all subjects and therefore links all subjects with a common thread?/////////regarding citation styles, it is stated that the variety of subjects and languages results in flexibility being recommended - choose something appropriate for the subject/////////advise on referencing audio-visual sources etc may imply multimodality	5, 7, 11, 9, 6, 14, 15, 8

Section	Subsection	Likely IDL Links	EoPPs to Consider
	Nature of Mathematics	"These two aspects of mathematics, a discipline that is studied for its intrinsic pleasure and a means to explore and understand the world we live in, are both separate yet closely linked"///////////the definition of mathematics focuses on how it is a language for building links and developing understanding of the world; often 2 linked stages (i.e. studying maths for maths, and then applying for real-world understanding)////////////"The side of mathematics that is based on describing our world and solving practical problems is often carried out in the context of another area of study. Mathematics is used in a diverse range of disciplines as both a language and a tool to explore the universe; alongside this its applications include analysing trends, making predictions, quantifying risk, exploring relationships and interdependence."//////////////mathematics has often developed out from the needs of other disciplines////////the two maths courses available are linked but different emphases on tools etc.////////////"These courses are designed for different types of students: those who wish to study mathematics as a subject in its own right or to pursue their interests in areas related to mathematics, and those who wish to gain understanding and competence in how mathematics relates to the real world and to other subjects."////////// choice from available maths subjects should reflect needs and interests of students//////////////implication that Maths: A&A is more pure subject-based whereas Maths A&I is more about real-world context (i.e. more ID?)////////////TOK provides opportunity to explore how maths knowledge and other domains are linked, this may involve exploring the apparent knowledge certainty that maths presumes, where as other subjects are perceived to have less "purity" - so engagement with specific nature of maths is here in relation to IDL////////////section linking to I-M shows IDL links, e.g. "Mathematics can transcend politics, religion and nationality, and throughout history great civilizations have owed their success in part to their mathematicians being able to create and maintain complex social and architectural structures"////////////heavy emphasis on links to other parts of the curriculum and to I-M etc. IDL may not be explicit here but is strongly implicit////////////CAS links used to link maths to practical application situations/////////////"MYP mathematics courses are concept-driven, aimed at helping the learner to construct meaning through improved critical thinking and the transfer of knowledge. The MYP courses use a framework of key concepts with which the concepts in the DP mathematics courses are aligned. These concepts are broad, organizing, powerful ideas that have relevance within the subject but also transcend it, having relevance in other subject groups"////////////age appropriateness highlighted in links to MYP course////////////links to CP are built around maths being a strong foundation for many areas of work and for having practical implications//////////skills development emphasised including critical thinking and communication	14, 15, 9, 6, 4, 7, 11

Section	Subsection	Likely IDL Links	EoPPs to Consider
	Approaches to the teaching and learning of mathematics: applications and interpretation	concepts enable links to other knowledge areas but also deep exploration of maths//////concepts link to real world /////////mathematics inquiry and problem solving not explicitly ID, but modelling is a subject-specific approach which blends into other disciplines implicitly///////////"Time has been allocated within the teaching hours for students to undertake the types of activities that mathematicians in the real world undertake and to allow students time to develop the skill of thinking like a mathematician–in other words providing students with a mathematical toolkit which will allow them to approach any type of mathematical problem."////////////" Teachers are encouraged to make explicit where these skills might transfer across areas of mathematics content and allow students to reflect upon where these skills transfer to other subjects the student is studying.", so scaffolded too	4, 14, 15, 9, 11, 3
	Aims	some implicit and explicit IDL in the list of aims, large focus on application and real-world uses///////skills referenced	6, 4, 11
	Assessment objectives	"Problem solving is central to learning mathematics and involves the acquisition of mathematical skills and concepts in a wide range of situations, including non-routine, open-ended and real-world problems."	6, 4
	Assessment objectives in practice		
Syllabus	Syllabus outline		
	Prior learning topics		
	Syllabus content	Real-world authentic problems and concepts with ID relevance are linked across many content areas, including explicit links to other specific subjects and broad knowledge areas/parts of the core////////////multiple clear examples of IDL in many content areas	6, 15, 14
Assessment	Assessment in the Diploma Programme		
	Assessment outline - SL		
	Assessment outline - HL		
	External assessment		
	Internal assessment	"Internal assessment is an integral part of the course and is compulsory for both SL and HL students. It enables students to demonstrate the application of their skills and knowledge and to pursue their personal interests without the time limitations and other constraints that are associated with written examinations."//////////student-led but scaffolded appropriately//////////emphasis on collaboration and skills such as communication and critical reflection//////should develop students' personal interests and focus on use of maths and links to technology etc	7, 12, 11, 3, 4
Appendices	Glossary of command terms		
	Notation list		

This table demonstrates that although some subsections of this resource do not link to interdisciplinarity, others shows a substantial number of comments which may link to the EoPPs. In particular, the subsection describing "The Nature of Mathematics" had many quotable and relevant comments. From the numbers which repeat most frequently in the rightmost column of the above table, the document is likely to link to interdisciplinary learning most consistently through the following ideas:

- EoPP 4 – Interdisciplinarity and its links to constructivist pedagogy,
- EoPP 6 – interdisciplinarity and its links to authentic project- and problem-based learning,
- EoPP 11 – links between interdisciplinary learning and a variety of key skills and competences.

However, this quantitative measure of potential EoPP links is less revealing than a careful reading of the contributions of this document in relation to the context of other DP and CP resources. In this wider context, one of the most important contributions of this document is that it provides links between interdisciplinarity and the discipline (and the specific disciplinary nature) of mathematics (EoPPs 14 and 15).

MYP: Projects Guide

This guide describes an important element of the MYP curriculum, one that has clear potential to cross the boundaries between subject-areas.

Table 17: Scoping Evidence in MYP: Projects Guide

Section	Subsection	Likely IDL Links	EoPPs to Consider
Introduction	Purpose of this guide	Grateful to the contributions of the global community	17?
MYP projects	Programme model	"The MYP emphasizes intellectual challenge, encouraging students to make connections between their studies in traditional subjects and the real world. It fosters the development of skills for communication, intercultural understanding and global engagement—essential qualities for young people who are becoming global leaders."/////////flexibility of the programme/////////meeting students' needs////////development of skills//////////ensures breadth and depth of study through subject groups//////////multiple languages//////////preparing students for workplace/LLL	4, 5, 7, 11
	Nature of the MYP projects	"The personal project encourages students to practise and strengthen their approaches to learning (ATL) skills, to consolidate prior and subject-specific learning, and to develop an area of personal interest. The personal project provides an excellent opportunity for students to produce a truly personal and often creative product/outcome and to demonstrate a consolidation of their learning in the MYP."////////constructivist pedagogy emphasised with occasional reference to using or crossing subjects	4
	Culminating experiences across the IB continuum	"There are strong links between the MYP projects and subject-specific assessments in the DP, such as the global politics engagement activity, through the nature of the task and the presentation style of the report; however, MYP projects relate most directly to the cores of the CP and the DP"//////////community project emphasises key skills that will be useful (transferable) in the workplace and community	10, 11, 5
	Aims	aims include using a variety of situations and sustained inquiry, no explicit ID	4
	Objectives	The objectives heavily imply use of subjects and crossing between subjects in order to identify issues of interest/global context////////transferable skills e.g. communication and social, thinking	7, 11
Organizing MYP projects	Requirements	project-based learning interacting with scaffolding and collaboration////////////whole school context	6, 3, 17
	The role of staff	whole school collaboration////////////scaffolding but student led	17, 3, 4
	Time frames for completing MYP projects	student-led and scaffolded projects//////////collaborating	3, 4

Section	Subsection	Likely IDL Links	EoPPs to Consider
	The language of MYP projects		
	Academic honesty		
Pedagogy of MYP projects	Inquiry in MYP projects	student-led inquiry at root of projects//////////identifying what they already know may invoke subject knowledge//////////scaffolding and collaborating, but again the ID context is only weakly implicit//////////constructivism but no strong links to ID	4, 7, 3
	Action in MYP projects	constructivist processes at work, but again no clear IDL//////////Examples of community project could be ID//////////"Students' learning process in the MYP personal project involves action in a wide range of forms, including:• developing an area of personal interest beyond the subject-specific curriculum"	4, 7
	Global contexts	global contexts listed are highly likely to be ID, these are at root of problem-solving (making that likely to be ID)//////////list of examples underscores that these are highly likely to be ID projects, but not clearly flagged as such	7
	Approaches to learning	" Projects, essays and investigations carried out in the subject groups are important vehicles for helping students to develop the skills and attitudes needed to complete MYP projects."//////////ATL skills join up the curriculum and lead to overlap between subjects and projects	14
	The process journal	process journal may be multimodal though not flagged in relation to the associated benefits	8
	Resources	variety of source types should be used (multimodal?)//////////"They will make connections with prior knowledge and new knowledge in potentially unfamiliar situations and identify solutions."//////////"They will need to reflect on what they have learned through completing the project. This learning relates to any topics that have been informed by subject-specific learning and how the transfer of this learning has impacted their project, as well as what they have discovered in relation to the project goal and the global context. It also relates to themselves as learners and their awareness or development of ATL skills."	8, 7, 4, 5, 14, 15
Completing the MYP community project	Community project objectives	Four objectives include reference to prior subject knowledge and general skill development	14, 11
	Investigating and planning the community project	the nature of the problem solving here is that it is likely to be ID, even if not flagged as such//////////types of communities available for research has ID scope//////////scaffolded student-led inquiry//////////the global contexts are likely to have an ID perspective//////////"Students need to recognize the knowledge they already have from previous experiences or from subject-specific learning and document how this will help them to achieve their goal. This prior learning will enable students to evaluate what knowledge and skills need to be gained through research and further investigation."	7, 4, 14

Section	Subsection	Likely IDL Links	EoPPs to Consider
	Presenting the community project		
	Using assessment criteria		
	Community project assessment criteria: Years 3 or 4	Subject-specific knowledge and wider research skills are described in assessment criteria///////////ID not explicit but implied by some criteria	14, 12, 13
Completing the MYP personal project	Personal project objectives	Identifying prior learning and subject-specific knowledge mentioned here too//////////emphasis on personal interests and goals	14, 7
	Investigating and planning the personal project	Examples highlight high likelihood of IDL/////////global contexts also high likelihood of IDL////////////"The global context helps the student engage in a cycle of inquiry and a process that leads him or her from academic knowledge to thoughtful, principled action."	7, 4, 5
	Reporting the personal project	Multimodal reporting likely	8
	Using assessment criteria		
	Personal project assessment criteria: Year 5	Subject-specific knowledge and wider research skills are described in assessment criteria///////////ID not explicit but implied by some criteria	12, 14
	Personal project moderation	"Subject-specific grade descriptors serve as an important reference in the assessment process. Through careful analysis of subject-group criteria and the general grade descriptors, they have been written to capture and describe in a single descriptor the performance of students at each grade for MYP projects. Subject-specific grade descriptors are also the main reference used to select grade boundaries for the personal project in each assessment session. "////////////"Successfully transfers knowledge and approaches to learning skills into the project with independence."	14, 12, 4
Appendices	MYP projects glossary	"product" as implicitly multimodal	8
	MYP projects command terms		
	Selected reading		

This table demonstrates that the majority of subsections in this document contain at least one type of potential link to interdisciplinary learning. Moreover, the majority of the 18 EoPPs have at least one potential link in this document. From the numbers which repeat most frequently in the rightmost column of the above table, the document is likely to link to interdisciplinary learning most consistently through the following ideas:

- EoPP 4 – Interdisciplinarity and its links to constructivist pedagogy,
- EoPP 7 – Curriculum flexibility enabling interdisciplinary learning,
- EoPP 14 – Interdisciplinary learning and disciplinarity mutually re-enforcing one another.

Within the broader context of other MYP documents, the contribution of links to EoPP 7 are particularly notable in *MYP: Projects Guide*. Links between interdisciplinary learning and students' personal interests (a key element of EoPP 7) come across particularly strongly in this document.

Appendix 3 – Bibliography

IB Documentation

International Baccalaureate Organisation. 2015. CP: From Principles into Practice.

International Baccalaureate Organisation. 2015. DP: From Principles into Practice.

International Baccalaureate Organisation. 2014. MYP: From Principles into Practice.

International Baccalaureate Organisation. 2018. PYP: From Principles into Practice – Overview.

International Baccalaureate Organisation. 2018. PYP: From Principles into Practice – The Learner.

International Baccalaureate Organisation. 2018. PYP: From Principles into Practice – The Learning Community.

International Baccalaureate Organisation. 2018. PYP: From Principles into Practice – Teaching and Learning.

International Baccalaureate Organisation. 2019. What is an IB Education?

International Baccalaureate Organisation. 2014. MYP: Projects Guide.

International Baccalaureate Organisation. 2020. MYP: Mathematics Guide.

International Baccalaureate Organisation. MYP: Mathematics TSM. HTML.

International Baccalaureate Organisation. 2020. MYP: Language Acquisition Guide.

International Baccalaureate Organisation. 2014. MYP: Language and Literature Guide.

International Baccalaureate Organisation. MYP: Language and Literature TSM. HTML.

International Baccalaureate Organisation. 2014. MYP: Individuals and Societies Guide.

International Baccalaureate Organisation. MYP: Individuals and Societies TSM. HTML.

International Baccalaureate Organisation. 2014. MYP: Fostering Interdisciplinary Teaching and Learning in the MYP.

International Baccalaureate Organisation. MYP: Fostering Interdisciplinary Teaching and Learning in the MYP TSM. HTML.

International Baccalaureate Organisation. 2020. DP: Theory of Knowledge Guide.

International Baccalaureate Organisation. 2014. DP: Theatre Guide.

International Baccalaureate Organisation. 2019. DP: Mathematics: Applications and Interpretation TSM.

International Baccalaureate Organisation. 2019. DP: Mathematics: Applications and Interpretation Guide.

International Baccalaureate Organisation. 2011. DP: Literature and Performance Guide.

International Baccalaureate Organisation. 2018. DP: Language B TSM.

International Baccalaureate Organisation. 2018. DP: Language B Guide.

International Baccalaureate Organisation. 2015. DP: Environmental Systems and Societies Guide.

International Baccalaureate Organisation. DP: Environmental Systems and Societies TSM. HTML.

International Baccalaureate Organisation. DP: Geography Guide. HTML.

International Baccalaureate Organisation. DP: Geography TSM. HTML.

International Baccalaureate Organisation. 2016. DP: Extended Essay Guide.

International Baccalaureate Organisation. 2015. DP: Creativity, Activity, Service Guide.

International Baccalaureate Organisation. 2015. CP: Reflective Project Guide.

International Baccalaureate Organisation. 2015. CP: Personal and Professional Skills Guide.

International Baccalaureate Organisation. 2021. MYP: Interdisciplinary Teaching and Learning in the MYP.

International Baccalaureate Organisation. 2022 (draft). DP: Literature and Performance Guide.

International Baccalaureate Organisation. Xxxx (draft). DP: The EE Interdisciplinary Pathway.

International Baccalaureate Organisation. 2018. Programmes Standards and Practices.

International Baccalaureate Organisation. PYP: Multiliteracies TSM. HTML.

General Literature

Al Salami, M.K., Makela, C.J. and de Miranda, M.A. 2017. Assessing changes in teachers' attitudes toward interdisciplinary STEM teaching. International Journal of Technology and Design Education, 27(1), pp. 63-88.

Andersson, S., Bergstrom-Nyberg, S., Dumbrajs, M., Dumbrajs, S., Martelin, V., and Westerlund, T. 2010. Interdisciplinary Education in Comprehensive School: Can a Deep Understanding Occur?. Online Submission, 7(9).

AP Board. 2020. AP Seminar. Course and Exam Description. Available at: https://apcentral.collegeboard.org/pdf/ap-seminar-course-and-exam-description.pdf?course=about-ap-capstone-diploma-program. [Accessed 2/12/2020].

Baillat, G., Niclot, D., Lenoir, Y. and Klein, J.T. 2010. In search of interdisciplinarity in schools in France: From curriculum to practice. Issues in Interdisciplinary Studies.

Bestelmeyer, S.V., Elser, M.M., Spellman, K.V., Sparrow, E.B., Haan-Amato, S.S. and Keener, A. 2015. Collaboration, interdisciplinary thinking, and communication: new approaches to K–12 ecology education. Frontiers in Ecology and the Environment, 13(1).

Birbili, M. 2007. Making the case for a conceptually based curriculum in early childhood education. Early Childhood Education Journal, 35(2), pp.141-147.

Brante, G. and Brunosson, A. 2014. To double a recipe–interdisciplinary teaching and learning of mathematical content knowledge in a home economics setting. Education Inquiry, 5(2), pp. 301-318.

Broto, V.C., Gislason, M. and Ehlers, M.H. 2009. Practising interdisciplinarity in the interplay between disciplines: experiences of established researchers. Environmental Science & Policy, 12(7), pp. 922-933

Bull, K.B. and Dupuis, J.B. 2014. Nonfiction and interdisciplinary inquiry: Multimodal learning in English and biology. English Journal, pp. 73-79.

Cambridge Assessment International Education. 2020. Implementing the Curriculum with Cambridge A guide for school leaders. Available at: https://www.cambridgeinternational.org/Images/134557-implementing-the-curriculum-with-cambridge.pdf. [Accessed 2/12/2020].

Cambridge Assessment International Education. 2020. SYLLABUS: Cambridge International AS & A Level Global Perspectives & Research 9239. Available at: https://www.cambridgeinternational.org/Images/414971-2020-2021-syllabus.pdf. [Accessed 2/12/2020]

Carrier, S., Wiebe, E.N., Gray, P. and Teachout, D. 2011. BioMusic in the classroom: Interdisciplinary elementary science and music curriculum development. School Science and Mathematics, 111(8).

CEDEFOP. 2014. Glossary of key terms. Available at: https://www.cedefop.europa.eu/en/events-and-projects/projects/validation-non-formal-and-informal-learning/european-inventory/european-inventory-glossary. [Accessed 2/12/2020].

Celedón-Pattichis, S., LópezLeiva, C.A., Pattichis, M.S. and Llamocca, D. 2013. An interdisciplinary collaboration between computer engineering and mathematics/bilingual education to develop a curriculum for underrepresented middle school students. Cultural Studies of Science Education, 8(4), pp. 873-887.

Choi, S. and Richards, K. 2017. Interdisciplinary discourse: Communicating across disciplines. Springer.

Core Standards. Preparing America's students for success. Available at: http://www.corestandards.org [Accessed 2/12/2020].

da Cristina Oliveira, M.C.O. 2017. Promoting STEAMH at primary school: a collaborative interdisciplinary project. New Trends and Issues Proceedings on Humanities and Social Sciences, 4(8), pp. 234-245.

Demirel, M. and Coşkun, Y.D. 2010. Case study on interdisciplinary teaching approach supported by project based learning. The International Journal of Research in Teacher Education, 2(3), pp. 28-53.

Deneme, S. and Ada, S. 2012. On applying the interdisciplinary approach in primary schools. Procedia-Social and Behavioral Sciences, 46, pp. 885-889.

Education Scotland. 2008. Curriculum for excellence building the curriculum 3 a framework for learning and teaching. Available at: https://education.gov.scot/Documents/btc3.pdf [Accessed 2/12/2020].

Education Scotland. 2012. CfE Briefing Interdisciplinary Learning. Available at: https://education.gov.scot/Documents/cfe-briefing-4.pdf. [Accessed 2/12/2020].

Education Scotland. 2020. Interdisciplinary Learning: ambitious learning for an increasingly complex world. Available at: https://education.gov.scot/media/mkomulen/interdisciplinary-learning-thought-paper.pdf [Assessed 2/12/2020].

Eleftheria, T., Sotiriou, S. and Doran, R. 2016. The "Big Ideas of Science" for the school classroom: Promoting interdisciplinary activities and the interconnection of the science subjects taught in primary and secondary education. Journal of Research in STEM Education, 2(2), pp. 72-89

English, L.D. 2016. STEM education K-12: Perspectives on integration. International Journal of STEM education, 3(1).

European Union. 2019. *Key Competences for Lifelong Learning*. Accessed at https://op.europa.eu/en/publication-detail/-/publication/297a33c8-a1f3-11e9-9d01-01aa75ed71a1/language-en. [Accessed 03/12/2020].

Fadeeva, Z., Mochizuki, Y. and Parker, J. 2010. Competencies for interdisciplinarity in higher education. International Journal of Sustainability in Higher Education.

Ferri, R.B. 2019. Educación Matemática Interdisciplinaria en la escuela-ejemplos y experiencias. UCMaule, (57), pp. 25-37.

Furinghetti, F. and Somaglia, A. 1998. History of mathematics in school across disciplines. Mathematics in school, 27(4), pp. 48-51.

Gero, A. and Zach, E. 2014. High school programme in electro-optics: A case study on interdisciplinary learning and systems thinking. International Journal of Engineering Education, 30(5), pp.1190-1199.

Hardré, P.L., Ling, C., Shehab, R.L., Nanny, M.A., Nollert, M.U., Refai, H., Ramseyer, C., Herron, J. and Wollega, E.D. 2013. Teachers in an interdisciplinary learning community: Engaging, integrating, and strengthening K-12 education. Journal of Teacher Education, 64(5), pp. 409-425.

Harris, V. and Grenfell, M. 2004. Language-learning strategies: A case for cross-curricular collaboration. Language Awareness, 13(2), pp. 116-130.

Hasni, A., Lenoir, Y. and Alessandra, F. 2015. Mandated Interdisciplinarity in Secondary School: The Case of Science, Technology, and Mathematics Teachers in Quebec. Issues in Interdisciplinary Studies, 33, pp.144-180.

Hedegaard-Soerensen, L., Jensen, C.R. and Tofteng, D.M.B. 2018. Interdisciplinary collaboration as a prerequisite for inclusive education. European Journal of Special Needs Education, 33(3), pp. 382-395

Helmane, I. and Briška, I. 2017. What is developing integrated or interdisciplinary or multidisciplinary or transdisciplinary education in school?. Signum Temporis, 9(1), p. 7.

Howe, A.C. and Bell, J. 1998. Factors associated with successful implementation of interdisciplinary curriculum units. Research in Middle Level Education Quarterly, 21(2), pp. 39-52.

International Bureau of Education. UNESCO. Interdisciplinary approach. Available at: http://www.ibe.unesco.org/en/glossary-curriculum-terminology/i/interdisciplinary-approach.[Accessed 2/12/2020].

Kelley, T.R. and Knowles, J.G. 2016. A conceptual framework for integrated STEM education. International Journal of STEM Education, 3(1).

Klausen, S. H. 2014. Transfer and Cohesion in Interdisciplinary Education. Nordidactica: Journal of Humanities and Social Science Education, (1), pp. 1-20.

Klein, J.T. 2006. A platform for a shared discourse of interdisciplinary education.

Klein, J.T. 2010. A taxonomy of interdisciplinarity. The Oxford handbook of interdisciplinarity, 15.

Kodkanon, K., Pinit, P. and Murphy, E. 2018. High-school teachers' experiences of interdisciplinary team teaching. Issues in Educational Research, 28(4).

Lenoir, Y., Hasni, A., Lenoir, Y. and Klein, J.T. 2010. Interdisciplinarity in Quebec schools: 40 years of problematic implementation. Issues in Interdisciplinary Studies.; Broto *et al* pp. 922-933.

Mansilla, V.B. and Duraising, E.D. 2007. Targeted assessment of students' interdisciplinary work: An empirically grounded framework proposed. The Journal of Higher Education, 78(2).

Mansilla, V.B. 2016. Interdisciplinary learning: A cognitive-epistemological foundation. Margot and Kettler.

Williams, J., Roth, W.M., Swanson, D., Doig, B., Groves, S., Omuvwie, M., Borromeo Ferri, R. and Mousoulides, N. 2016. Interdisciplinary mathematics education. Springer Nature.

Margot, K.C. and Kettler, T. 2019. Teachers' perception of STEM integration and education: a systematic literature review. International Journal of STEM Education, 6(1).

McCulloch, G. 2002. 'Disciplines contributing to education?' Educational studies and the disciplines. British Journal of Educational Studies, 50(1), pp. 100-119. Available at: https://discovery.ucl.ac.uk/id/eprint/1568664/1/McCulloch2002Disciplines100.pdf. [Accessed 2/12/2020].

Nagle, B. 2013. Preparing high school students for the interdisciplinary nature of modern biology. CBE—Life Sciences Education, 12(2).

Nair, N.C., Archana, J.S., Chatterjee, S. and Bijlani, K. 2015, August. Knowledge representation and assessment using concept based learning. In 2015 International

Conference on Advances in Computing, Communications and Informatics (ICACCI) (pp. 848-854). IEEE.

Nargund-Joshi, V., Liu, X., Chowdhary, B., Grant, B. and Smith, E. 2013, April. Understanding meanings of interdisciplinary science inquiry in an era of next generation science standards. In annual meeting of National Association for Research in Science Teaching, Rio Grande, Puerto Rico.

Nikitina, S. 2006. Three strategies for interdisciplinary teaching: contextualizing, conceptualizing, and problem-centring. Journal of curriculum studies, 38(3), pp. 251-271.

Pearson Qualifications. 2019. Pearson Edexcel Level 3 Extended Project. Available at: https://qualifications.pearson.com/en/qualifications/edexcel-project-qualification/level-3.html. [Accessed 2/12/2020].

Pearson Qualifications. About the Project Qualification. Available at: https://qualifications.pearson.com/en/qualifications/edexcel-project-qualification/teaching-support/links-with-subjects.html. [Accessed 2/12/2020].

Pearson Qualifications. Edexcel Extended Project. Available at: https://qualifications.pearson.com/content/dam/pdf/Project-Qualification/Level-3/2010/Teaching-and-learning-materials/Extended-Project-Casestudy.pdf [Accessed 2/12/2020].

Pharo, E., Davison, A., McGregor, H., Warr, K. and Brown, P. 2014. Using communities of practice to enhance interdisciplinary teaching: Lessons from four Australian institutions. Higher Education Research & Development, 33(2), pp. 341-354.

Pischke, E.C., Knowlton, J.L., Phifer, C.C., Lopez, J.G., Propato, T.S., Eastmond, A., de Souza, T.M., Kuhlberg, M., Risso, V.P., Veron, S.R. and Garcia, C. 2017. Barriers and solutions to conducting large international, interdisciplinary research projects. Environmental management, 60(6), pp. 1011-1021.

Quebec Education Programme: Secondary Cycle 2. Available at: http://www.education.gouv.qc.ca/fileadmin/site_web/documents/education/jeunes/pfeq/PFEQ_competences-transversales-deuxieme-cycle-secondaire_EN.pdf. [Accessed 2/12/2020].

Ramaswami, A., Russell, A., Chertow, M., Hollander, R., Tripathi, S., Lei, S., Cui, S. and Nagpure, A.S. 2014. International, interdisciplinary education on sustainable infrastructure and sustainable cities: key concepts and skills. The Bridge, 44(3).

Rennie, L.J., Venville, G. and Wallace, J. 2011. Learning science in an integrated classroom: Finding balance through theoretical triangulation. Journal of Curriculum Studies, 43(2), pp. 139-162.

Repko, A., Navakas, F. and Fiscella, J. 2007. Integrating interdisciplinarity: How the theories of common ground and cognitive interdisciplinarity are informing the debate on interdisciplinary integration. Issues in Interdisciplinary Studies.

Richards, J., Skolits, G., Burney, J., Pedigo, A. and Draughon, F.A. 2008. Validation of an interdisciplinary food safety curriculum targeted at middle school students and correlated to state educational standards. Journal of Food Science Education, 7(3), pp. 54-61.

Rodríguez, J.G., Blasco, C.M., Lenoir, Y. and Klein, J.T. 2010. Interdisciplinarity and research on local issues in schools: Policies and experiences from Colombia. Issues in Interdisciplinary Studies.

Rooks, D. and Winkler, C. 2012. Learning interdisciplinarity: Service learning and the promise of interdisciplinary teaching. Teaching Sociology, 40(1).

Rose, J. 2009. Independent review of the primary curriculum: final report (London, DCSF).

Segovia, I., Lupiáñez, J.L., Molina, M., Lenoir, Y. and Klein, J.T. 2010. The conception and role of interdisciplinarity in the Spanish education system. Issues in Interdisciplinary Studies.

Shapiro, E.J. and Dempsey, C.J. 2008. Conflict resolution in team teaching: A case study in interdisciplinary teaching. College teaching, 56(3), pp. 157-162.

Smith, J. and Karr-Kidwell, P.J. 2000. The Interdisciplinary Curriculum: A Literary Review and a Manual for Administrators and Teachers.

Spintzyk, K., Strehlke, F., Ohlberger, S., Gröben, B. and Wegner, C. 2016. An Empirical Study Investigating Interdisciplinary Teaching of Biology and Physical Education. Science Educator, 25(1), pp. 35-42.

SQA. 2009. National Unit Specification: general information: Science: Interdisciplinary Project (Advanced Higher). Available at: https://www.sqa.org.uk/sqa/files_ccc/Science_Interdisciplinary_Project.pdf. [Accessed 2/12/2020].

SQA. 2020. The Scottish Baccalaureate in Social Sciences. Available at: https://www.sqa.org.uk/sqa/48660.html. [Accessed 2/12/2020].

St Clair and Hough; Gero, A. and Zach, E. 2014. High school programme in electro-optics: A case study on interdisciplinary learning and systems thinking. International Journal of Engineering Education, 30(5), pp. 1190-1199.

St Clair, B. and Hough, D.L. 1992. Interdisciplinary Teaching: A Review of the Literature

Stern, J., Ferraro, K., and Mohnkern, J. 2017. Tools for teaching conceptual understanding, secondary: Designing lessons and assessments for deep learning. Corwin Press.

Turner, S. 2000. What are disciplines? And how is interdisciplinarity different. Practising interdisciplinarity, pp. 46-65.

von Lengerke, T. 2006. Public Health is an Interdiscipline, and about Wholes and Parts: Indeed, Critical Health Psychology Needs to Join Forces. Journal of Health Psychology. 11(3), pp. 395-399.

Wang, H.H., Charoenmuang, M., Knobloch, N.A. and Tormoehlen, R.L. 2020. Defining interdisciplinary collaboration based on high school teachers' beliefs and practices of STEM integration using a complex designed system. International Journal of STEM Education, 7(1), pp. 1-17.

Warr, M. and West, R.E. 2020. Bridging Academic Disciplines with Interdisciplinary Project-based Learning. Interdisciplinary Journal of Problem-Based Learning, 14(1).

Winkelhake, K.M., 2015. Case study exploring the use of an interdisciplinary approach to teach a high school mathematics and science topic. Northeastern University.

You, H.S. 2017. Why Teach Science with an Interdisciplinary Approach: History, Trends, and Conceptual Frameworks. Journal of Education and Learning, 6(4).

Young, M. 2010. The future of education in a knowledge society: The radical case for a subject-based curriculum. Journal of the Pacific Circle Consortium for Education, 22(1), pp. 21-32.