



PYP Thinking Skills Project
Funded by the IB

Research Report Executive Summary

Student Thinking and Learning in the PYP Transdisciplinary Framework Case Studies from PYP Schools

by

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September 2016

To cite the full report:

McGuinness, C., Swartz, R. and Sproule, L. (2016) *Student Thinking and Learning in the PYP Transdisciplinary Framework: Case Studies from PYP Schools*. The Hague, Netherlands: International Baccalaureate Organization.

The full report is available to download from <http://www.ibo.org/research>

1 Purpose of the report

The report was commissioned by the IB and builds on previous IB reports by the authors on developing and assessing thinking skills (Swartz & McGuinness, 2014a, 2014b).

The report focuses on the transdisciplinary framework of the IB's Primary Years Programme (PYP), specifically how the transdisciplinary thinking skills framework can advance deep learning and thinking for PYP learners aged 3-12 years of age. The findings from the report will inform the on-going review of the PYP. A mixture of theoretical analyses, literature review, classroom vignettes and empirical findings from PYP case study schools was used to answer the following three research questions.

- What is the relationship between deep learning and thinking and, specifically, the role of thinking in deeper learning? What are the views of PYP case study schools on this question?
- What kinds of teaching promote skillful thinking and deep learning and how are they best organized? What are the current practices in PYP case study schools with regard to articulating thinking as a curriculum objective, their general approaches to teaching thinking and classroom practices?
- How are progressions in thinking represented at various levels - in the research literature and in national curricula? How are students' thinking progressions defined in PYP school-based practice?

Seventeen in-depth interviews were conducted with PYP coordinators and teachers from seven PYP case study schools, and ten teachers submitted videos of their lessons as the basis for their interviews. Five schools from a randomly selected list of PYP schools responded to an open call to participate in the research project and two schools were directly approached because of their previously known specific interests in teaching thinking. Both public and private schools from the three IB geographical regions were included in the case study sample.

2 Key findings from the literature review and theoretical analyses

- The relationship between deep learning and thinking was positioned within the wider landscape of educational discussions about the relative merits of 'mastery of subject knowledge' vs 'learning 21st century skills' as curriculum priorities for schools and school systems. Following reviews of the research literatures on effective learning and effective thinking, the report concluded that there was

no need to juxtapose deep learning of subject content and skillful thinking as opposites. Rather, conclusions from the research literatures indicated that effective learning and effective thinking consist of similar key ingredients: the need for well-developed and flexible knowledge bases; the capacity to use thinking strategies and heuristics across a range of situations; the capacity to be metacognitive and self-regulated about learning and thinking; and the importance of thinking dispositions and positive beliefs about the self as a learner and thinker. These ingredients are captured in the term - adaptive competence - defined as “the ability to apply meaningfully-learned knowledge and skills flexibly and creatively in new situations” (de Corte, 2010, p 47).

- Building on these common key ingredients, the report then explored more fully the role of thinking in deep learning, and specifically how this might play out in a primary classroom. The following effective thinking activities were identified as contributing to deep learning, ensuring that the learning : (1) is *constructed* from relevant prior knowledge and relevant new information ; (2) includes *the use of skillful thinking* (not just any kind of thinking); (3) depends on the activation of *positive thinking dispositions* and *positive beliefs about one’s thinking ability*; (4) grows out of *collaborative thinking*; (5) is *monitored by metacognitive processes*; (6) is based on *self-regulated thinking*.

These six thinking activities were illustrated through seven classroom vignettes that vividly illustrate how the processes can unfold in moment-by-moment interchanges between teachers and students in classrooms. It was pointed out that the social nature of thinking can be further enhanced through the development of ‘thinking classrooms’ and schools that promote a culture of thinking.

- With regard to progression in thinking, the report pointed to the inconsistent use of terminology in the educational research literature, with the terms *developmental continuum*, *thinking progression*, *thinking continuum* and *progress maps* being used to describe progressions. Nevertheless, it was recognised that progressions can differ in their grain size – some zooming in on thinking developments over a short time space related to a specific kind of thinking (e.g. problem solving), which the report called a **developmental continuum**, and some zooming out to cover a wider developmental span and cross-curriculum perspective, which the report called **age-related progression**. The educational usefulness of thinking progressions are exactly the same as the benefits attributed to learning progressions more generally – they provide a thread whereby teachers can build on what has gone before and prompt what is likely to come next; they help teachers observe how learners are progressing and give appropriate feedback; as well as portraying

a bigger picture with regard to the development of broader 21st century skills. These broader learning goals do not usually feature much in age-related expectations or grade descriptions.

Despite these benefits, the report cautioned against representing thinking progressions as simple linear pathways, arguing that they are more likely to follow a dynamic and spiral-like pattern as learners face new learning challenges and become more self-regulating as they move through the primary grades. It was also noted that, for the most part, thinking progress maps (of all kinds) are based on experts' professional judgements, informed to a greater or lesser extent by theoretical models of thinking, and pockets of relevant research evidence. They are NOT empirical progressions, based on observations of cohorts of children's thinking as they progress through school. Examples of four different kinds of thinking progressions, two from the research literature and two national curricula, are described and critiqued in the report.

3 Key findings from the PYP case study schools

About the relationship between deep learning and thinking:

- The PYP promotes a style of constructivist learning, based on making certain "transdisciplinary themes" and their exploration via a set of important "key concepts" using inquiry methods, as the key learning goals. Everyone interviewed not only showed a clear understanding of this but a firm commitment to its superiority over standard disciplinary learning, which risks more fragmented learning and memory-based rote learning.
- The interviewees clearly recognized that learning needed to have a degree of permanency if it was considered to be worthwhile, but also a degree of flexibility to allow it to be useful across a range of situations. In other words, if learning is to be called deep then it must be transferable. Several respondents appreciated the crucial role that higher-level and effective thinking would have in making learning deep and thus more transferable. Some interviewees also captured the more metacognitive aspects of learning such as becoming aware of the process in order to make it deeper. There was also a hint that there was more to deep learning than pure cognition – that deep learning could also invoke the emotions, and could have wide ranging effects on how we presented and managed ourselves to the world.
- Although these features were not expressed by each respondent, collectively they bear a strong resemblance to contemporary views on learning as captured in the idea of adaptive

competence, identified as a key idea from the research literature – that deep learning is transferable, involves strong conceptual understanding, requires thinking plans and devices to make it deep, is metacognitive, has some non-cognitive as well as cognitive components, and requires some degree of self-management. Participant views on learning were certainly not minimalist.

About articulating thinking as an objective, approaches and classroom practices:

- From the interviews it emerged that the case study schools differed in the degree to which they prioritized thinking as an explicit curriculum objective, and whether it was given specific instructional attention above and beyond the other PYP transdisciplinary skills. Perhaps not surprisingly, the two case study schools that were selected for the study because of their known practices with regard to teaching thinking were different from the schools that responded to the open call to participate. These two schools had embraced thinking skills within the PYP framework in a more comprehensive way, drawing on well-established programmes for teaching thinking such as Harvard’s Project Zero’s Visible Thinking and Teaching for Understanding (Ritchhart et al., 2011), Swartz’s Thinking-Based Learning (Swartz et al., 2007) and, in the case of one school, both of these approaches, in combination with other programmes such as Habits of Mind (Costa and Kallick, 2014) and Philosophy for Children (Lipman et al., 1980). But even these two schools were different from one another, with one school prioritizing thinking as an explicit curriculum objective more than the other.
- While ALL teachers made reference to some aspect of the PYP thinking skills framework in their unit planners, their approaches differed in how these plans translated into classroom practices. For example, some PYP coordinators said that more sophisticated thinking was carried along with the exploration of the PYP key concepts and that it was the key concepts that provided the cross-curricular coherence. Other coordinators mentioned that the pedagogical inquiry model was dominant in their approach to teaching thinking, and particularly that the interactive nature of the teaching associated with inquiry was an important vehicle for developing thinking skills. Some teachers mentioned that they used well-known resources and tools to support thinking, such as mind-maps, graphic organizers, de Bono’s six hats, and thinking routines, but these were preferences at the level of individual teachers rather than comprehensively used across the school.
- Despite the differences between the approaches that the schools adopted and the variety of thinking ‘tools’ that the teachers used, there were some common features. For example, many

teachers mentioned they used *questioning* to prompt students to think; others used *thinking/graphic organizers* as a method for helping students create more meaningful patterns to their thinking; others had well-developed methods for *documenting and recording students' thinking* (sometimes using e-portfolios); others privileged the development of students' *language for talking about thinking*, and prompted *metacognitive thinking* in various ways; and *group work and collaborative thinking* was evident in many of the lesson videos. Clearly, not all teachers used all of these methods.

- Where thinking was prioritized, these schools expended considerable time, effort and resource into developing their teachers' professional competence with regard to teaching thinking.
- That said, all teachers reported a mixture of effective approaches to teaching thinking, showing some features in common with the key ingredients for deep learning and thinking identified through the literature review. They had significant practices to share with other PYP teachers.

With regard to progression in thinking -

- While the PYP guidance articulates many important features of a transdisciplinary curriculum in some detail (e.g., themes, key concepts, skills), it is virtually silent on what expectations PYP schools might have about how transdisciplinary skills learning progresses, or might be progressed, within a unit of inquiry, across units of inquiry or across the primary school years. For these reasons, it is not surprising that the case study schools had made little progress on this issue.
- Only two case study schools had any written documentation on age-related thinking progression – prompted in one instance through involvement with specific teaching thinking programmes, and in the other instance through the availability of an age-related thinking continuum at national/state level.
- There was more widespread use of checklists and rating scales which teachers used for assessing specific pieces of students' work, for end of year assessment, and for student self-assessment. There was very little evidence of the use of developmental continua designed to show 'next steps' as in a formative assessment cycle.
- Whether documented or not, PYP coordinators and teachers held implicit views about the likely nature of progression in thinking, ranging from linear progression models to models that were more spiral and multidimensional. While there may not have been documents outlining these expectations, the implicit views and expectations influenced the teachers' planning, as well as their teaching and assessment practices.

- PYP coordinators and teachers recognised the challenges they faced to articulate a coherent model of progression in their students' thinking, and in recognising more clearly features of students' work/performances that would provide evidence for that progression. They would welcome some guidance from the PYP curriculum team on this.

4 Recommendations

Recommendation 1:

The report recommends that the IB elevate good thinking, in all its forms, to become a key objective of the PYP. This would mean giving it the same status as the mastery and use of the key concepts in the PYP curriculum. The purpose would be to change the way thinking is handled in PYP lesson and unit planning, and convey the message to PYP schools that good thinking is not just about the issues within a specific unit of inquiry - important though that is. Rather, elevating thinking as an explicit curriculum objective, in a manner similar to key concepts, would show that becoming a good thinker is sufficiently important in the value system of the IB, to articulate a set of thinking-related objectives and ask that they be explicitly addressed in all PYP planning.

Recommendation 2:

The different elements of the PYP Transdisciplinary Framework are presented in a fragmented way – themes, concepts, skills, attitudes, learner attributes. These elements are all presented as lists, leaving implicit how they are likely to interact, or which ones might be more important than others. The report recommends, therefore, that the IB either creates or utilizes what is included in this report -- a diagrammatic framework showing how the ingredients in a thinking curriculum fit together, as we have described it, and then relate it to the ingredients in the present PYP instructional framework: basically, *to create a framework for teaching thinking in the PYP*. We also recommend that the IB make available to all PYP schools the conceptual material that fleshes out such a framework: a set of published resources that can inform teachers of the details of this new thinking-oriented framework. It is suggested that material from the current and previous research reports on thinking skills, commissioned by the IB, could be usefully included.

Recommendation 3:

The report recommends that the IB provide a series of robust teacher-development workshops on teaching thinking in the PYP as conceptualized in this report (Section 2 and Section 5). By “robust” is

meant that this programme should, at the least, contain a coaching component in which coaching on classroom implementation is provided to individual teachers, to groups of teachers or to schools. This is the kind of teacher-training programme that the major research on teacher-development has shown is maximally effective.

The report notes that some programmes designed to bring thinking into classrooms specialize in only one or two important aspects of teaching thinking. The reports suggests, however, that the IB put together these workshop opportunities to address all SIX of the key ingredients (Section 2 and Section 5) that we identified as important for a coherent thinking programme. These should be tailored specifically to the objectives of the PYP so that they complement each other. For example, teaching students to use thinking routines should not be presented as a competing alternative to teaching them how to engage in skillful thinking, but rather as two components in a larger enterprise that complement each other.

Recommendation 4:

The report recommends that the IB set up regional conferences on teaching thinking in a PYP context in which teachers could demonstrate some of their thinking lessons and thinking activities and discuss together, how they work, and how they might be either adapted to other contexts, or enriched.

Recommendation 5:

Without explicit models or even schematic expectations of how specific types of thinking might develop in school classrooms, it is difficult for schools to create developmental thinking continua or progress maps for either specific tasks or for age-related expectations. Doing this successfully presupposes that a coherent framework for teaching thinking of the sort identified in this report has been consistently adopted in some PYP schools, and that teachers have mastered instructional techniques that they judge make their work with thinking skills effective. Then, how such a framework plays itself out in a PYP school needs to be monitored and the results recorded.

Hence the report recommends that the IB make this an active and ongoing research project in all PYP schools, with an on-site manager organizing this in each school, and a central coordinator with a research team collecting the data, evaluating it, and making recommendations of expected progressions in thinking by grade level. The report considers that the IB is very well placed to conduct this type of research/ development work, thus setting realistic standards for the development and assessment of thinking abilities, not only in PYP schools but in the broader

community of schools that have committed themselves to teaching students to be good thinkers. That would certainly be viewed as a contribution by the community of teaching thinking scholars and practitioners.

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