



# A study on the Impact of the International Baccalaureate's Professional Development

Final Report

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## Executive Summary

Teachers have consistently been described as the “single most important driver of student achievement” after family background (Hattie, 2012). For this reason, education departments and school systems throughout the world have increasingly invested in educator learning and development, aiming to align teaching practices with the most recent educational and pedagogical research. Despite the importance of ongoing learning and development, many education systems struggle to implement professional learning programs that actually improve teaching practices and student outcomes (Jensen, Hunter, Sonnemann & Cooper, 2014).

At the International Baccalaureate (IB), more than 80,000 teachers and school leaders participate in more than 4,500 workshops each year (IB, 2016). As part of an ongoing effort to understand the impact and value of the Organisation’s programs and services, the IB commissioned the Centre for Program Evaluation (CPE) at The University of Melbourne (UoM) to conduct a study on the impact of the IB’s professional development work.

Between January 2017 and early 2019, CPE conducted a series of surveys, observations and interviews with educators across the globe. This study aims to answer the following research questions:

1. **IB PD Model:** What does IB’s model for professional development look like in theory?
2. **Critical Features:** What does the research literature identify as critical features of high-quality professional development?
3. **Theory-to-Practice:** How do IB models compare to professional development best practices?
4. **Knowledge, attitudes, beliefs:** What is the difference in teacher knowledge, attitudes and beliefs before and after participation in IB face-to-face workshops?
5. **Self-efficacy:** (a) What is the difference in teachers’ levels of self-efficacy before and after participation in face-to-face workshops? (b) What is the difference in schools’ collective self-efficacy before and after their teachers participate in face-to-face IB workshops?
6. **Instructional practice:** (a) To what extent do workshop participants change or extend their instructional practices in ways aligned with the content and learning outcomes of IB face-to-face workshops, in particular their application of IB-related pedagogies? (b) To what extent are these changes to practice sustained over time?

To address the above questions, CPE conducted a multiphase mixed-methods study that incorporated four key phases: (1) a literature review; (2) a theory-to-practice comparison; (3) a pre/post non-equivalent comparison group outcome study; and (4) a repeated measures design that assessed changes in instructional practice over time. This report presents a synthesis of



findings from Phases 1 to 3 of this study and explores Research Questions 1 to 5. Findings for Phase 4 will be submitted as a supplementary report.

During **Phase 1**, in response to Research Question 2, the research team identified nine critical features of high-quality professional development, illustrated in Table 1 below.

Table 1: Critical Features of High-Quality Teacher Professional Development

<p>1. Sustained Length</p>	<p>Longer professional development programs tend to have a greater effect. Meta-analyses show workshops less than <b>14 hours</b> in length typically show no significant effects on student achievement. The most consistent effects on teacher practice are generally found when program participation is over 100 hours (Banilower <i>et al.</i>, 2007).</p>
<p>2. Integrate Practice &amp; Feedback</p>	<p>Opportunities for <b>regular practice and ongoing feedback</b> are critical when learning and implementing new skills. Consistent with broader research on deliberate practice, educational research suggests teachers need multiple attempts (e.g., 20 separate practices; Joyce &amp; Showers, 2002) to master a new skill.</p>
<p>3. Job-embedded</p>	<p>To be maximally effective, research recommends that programs be <b>school based</b> and closely related to the daily work of teachers.</p>
<p>4. Ensure Coherence with Curriculum &amp; Content</p>	<p>When professional development programs relate to the <b>current school curriculum</b> and teachers' <b>specific subject areas</b>, they tend to be more effective in changing participants' teaching practices. In this way, high-quality professional development is needs-driven: driven both by the needs of the school and the needs of teachers.</p>
<p>5. Professional Development as a Collective Endeavour</p>	<p>Collaboration is a mediating factor between professional development and teaching practice, with high levels of <b>active teacher collaboration</b> typically strengthening the effectiveness of quality PD. <b>Collective participation</b>—i.e., teachers attending collectively so they can build a shared understanding of the PD content—has previously been referred to as one of five features of effective professional development.</p>
<p>6. Ensure an Engaged &amp; Effective School Leadership</p>	<p>Effective leadership practices include <b>leaders participating in</b>, not just organising professional learning. Robinson (2011) cites this as the leadership behaviour with the greatest effect size in her study of effective leadership. Alongside any professional development process, school leaders should also <b>build the social infrastructure</b> for effective PD by creating an environment where professional learning is valued and where there is a supporting learning culture in which teachers are able to learn and grow in their effectiveness over time.</p>



7. Target Beliefs & Attitudes	Teacher beliefs influence practice. It is therefore important that those who design and deliver professional development acknowledge this influence and endeavour to identify each cohort’s underlying beliefs and attitudes—especially those that are malleable—prior to beginning the professional development program.
8. Acknowledge & support cultural diversity	Just as high-quality teaching involves acknowledging students’ diverse cultural backgrounds and differentiating teaching, high-quality professional development also involves acknowledging participants’ diverse cultural backgrounds and <b>adapting content and delivery to target participants’ diverse cultural contexts.</b>
9. Embeds principles of andragogy	The professional development program is <b>consistent with principles of andragogy</b> , such as: incorporating explicit learning goals for learning and practice; active learning; relevance to daily work; encouraging personal responsibility; and building on participants’ past experiences.

In assessing the IB’s professional development model against these features in **Phase 2** of the study, the research team utilised a custom-designed rubric (see Table 2), assigning each of the nine features a rating of: (1) ‘substantial’, (2) ‘some’, (3) ‘limited’ and (4) ‘none at this stage’ to indicate the extent to which that feature was reflected in the IB’s professional development model.

*Table 2: Rubric Used to Assess the IB Professional Development Model*

Substantial	Some	Limited	None at this stage
There is substantial evidence this feature is <b>fully reflected</b> in the IB professional development model. A reasonable person, on reviewing the PD model, could easily recognise this feature – in its entirety – as being present in the IB PD model.	There is evidence that <b>some</b> parts of this feature are <b>reflected</b> in the professional development model.	There is evidence that small parts of this feature are <b>minimally reflected</b> in the professional development model.	Either (1) there is <b>no evidence</b> of this feature in the IB professional development model; (2) elements of the model are <b>at odds</b> with / inconsistent with this critical feature; or (3) this feature is outside the scope of the IB’s current professional development model.

Key findings from the second phase of the study indicate that the IB PD model is highly aligned to the research literature in some domains—namely, coherence with curriculum and content and consistency with principles of andragogy (see Table 3). However, there are also clear gaps in other domains, including the model’s use of practice and feedback, its inclusion of school leadership in the professional learning process, and its focus on teacher beliefs and attitudes.



Table 3: Overall Assessment of the IB PD Model

1. Sustained Length	Limited
2. Integrate Practice & Feedback	None at this stage
3. Job-embedded	Limited
4. Coherence with Curriculum & Content	Substantial
5. PD as a Collective Endeavour	Some
6. Engaged & Effective School Leadership	None at this stage
7. Target Beliefs & Attitudes	None at this stage
8. Acknowledge & support cultural diversity	Some
9. Embeds principles of andragogy	Substantial

More specifically, while the IB's professional development model is strongly aligned with principles of andragogy and educators' curriculum and career, its PD offerings are also:

- Considerably shorter than is recommended in the research literature;
- Typically delivered outside school contexts (i.e., they are not school-based);
- Have few/no structured opportunities for ongoing practice and feedback built into the model;
- The role of the school leader, either as participant or collaborator, is not embedded into the PD model; and
- Demonstrate little evidence that teacher attitudes and beliefs inform either the design or delivery of the PD.

During **Phase 3** (Outcome Study 1), CPE conducted two online surveys, and a small number of purposively sampled interviews ( $n = 7$ ). **171** educators completed pre- and post-surveys: **108** who had attended one of three IB face-to-face workshops<sup>1</sup>, and **63** who did not attend workshops but

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<sup>1</sup> Selected workshops include: Making the PYP Happen in the Classroom (Category 1), Approaches to Learning in the MYP (Category 3), and DP History (Category 2).



were included in a comparison group for study analyses. Comparative analyses were conducted. Key findings include:

- **Positive change in some domains:** Findings suggest many educators in this sample reported stronger PD outcomes after taking part in IB professional development workshops. After attending IB PD workshops, PD participants, on average, reported significantly higher:
  - Feelings of general self-efficacy with respect to workshop content;
  - Feelings of context-specific self-efficacy, with respect to applying workshop content in their current classrooms and school contexts;
  - Feelings of collective self-efficacy related to workshop content; and
  - More positive attitudes towards the IB's approaches to teaching and learning.
- **Small to large effect sizes:** In general, change was particularly pronounced for measures of self-efficacy (*effect size* for general self-efficacy = 1.21; *effect size* for context-specific self-efficacy = 0.68). That is, educators' beliefs that they (1) understand workshop content, (2) know how to put it into practice, and (3) can implement workshop strategies within the constraints of their current school environments. Smaller effect sizes were observed in other domains.
  - Given the critical role self-efficacy plays in supporting educator practice, the above findings are an initial and positive indication of the potential for IB professional development to shape instructional practice at IB World Schools.

**What is an effect size?** Effect sizes are a simple way of measuring the size of differences between groups. Effect sizes of between 0 and 0.2 are considered small; 0.5 is considered medium and 0.8 is considered large. An effect size of 1.0 is one that is clearly noticeable – for example the difference between someone who is 160cm (5'3) and one who is 183cm (6'0; Hattie, 2008). Throughout this report, all effect sizes reported are Cohen's *d*.

- **Comparison group:** For the most part, similar changes were not observed for the comparison group, offering greater confidence in the view that observed changes may be attributed to the PD workshops, and not to natural improvements over time, or to the survey instruments themselves.
- **Less positive change in one domain:** At the same time, participants also reported more negative outcome expectancy beliefs after attending PD workshops, with participants more likely to believe that applying workshop content in practice would require them to work more hours and lead them to fall behind in other commitments.
- **Context:** Findings also suggested several contextual features that were related to positive PD outcomes in this sample; namely the presence of:
  - Organisational norms that support and expect educators to put what they learn during workshops into practice; and
  - School environments where there is a strong sense of collective self-efficacy.

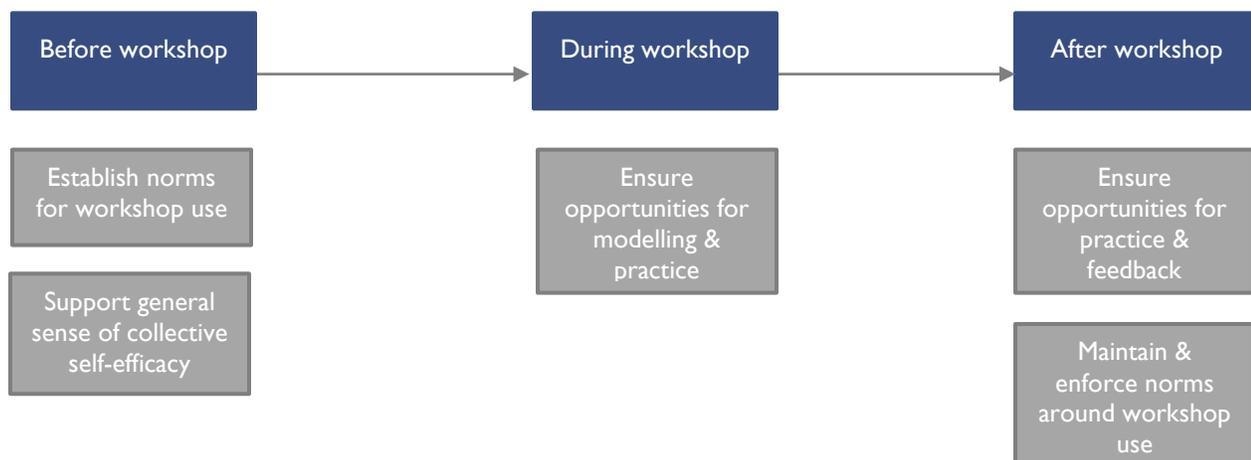


Where these two features were in place, teachers tended to report more positive attitudes, beliefs, and stronger self-efficacy and collective self-efficacy.

- **Mechanisms:** Similarly, attitudes, beliefs and self-efficacy tended to be higher when two specific mechanisms were in place. That is:
  - *Modelling & practice – during workshop:* when participants had opportunities to practise applying workshop content; or to observe workshop leaders model workshop strategies, outcomes tended to be higher.
  - *Practice & feedback – after workshop:* when participants had opportunities to practise applying workshop strategies, and to obtain feedback on their efforts after attending workshops, PD outcomes also tended to be higher.

Based on these findings, a key conclusion emerging from this research is the idea that effective professional development is not the IB's responsibility alone. Instead, for participants in this study, strong professional development outcomes required a partnership between the IB and its World School partners, and the integration of critical success factors before, during and after attendance at professional development workshops (see Figure 1).

Figure 1: Critical Success Factors in this Study: Before, During and After PD Workshops





## Recommendations

Based on these findings, the following recommendations are proposed for consideration. It is recommended that:

1. IB Professional Development work with IB World Schools to explore strategies for supporting positive school norms and strong expectations around the use of workshop content and strategies.
2. Related to this, it is recommended that IB PD consider working with IB World School leaders to help build understanding of what constitutes a positive school culture and how to build cultures that support strong norms and expectations within local contexts.
3. Consistent with findings from **Phase 1** and **Phase 2**, it is recommended that the IB review workshop design and Quality Assurance processes to ensure that there are clear and consistent opportunities for participants to: (a) observe high-quality modelling of workshop content and strategies; and (b) to practise applying relevant content or strategies during the workshop experience.
4. Similarly, it is recommended that IB work with IB World Schools to explore opportunities for supporting and embedding structures for: (a) practising what is learnt during workshops; and (b) obtaining feedback on their efforts after PD workshops are complete.
5. Given that PD effects in this study were smaller for attitudes and beliefs, and this has not to date been a deliberate PD strategy, we suggest that IB also consider opportunities for embedding techniques that help workshop leaders identify and evaluate attitudes and beliefs into PD workshop leader training.
6. Finally, given the critical role that self-efficacy and collective self-efficacy play in supporting teacher practice, IB are encouraged to seek out a deeper understanding of self-efficacy and collective self-efficacy and strategies that might continue to support and deepen the relationship between IB workshops and changes in instructional practice.
7. Considering findings from Phase 2 of this study, the IB may also find it valuable to reflect on strategies for:
  - Engaging school leadership in the IB's professional learning process;
  - Supporting workshop leaders to target teacher attitudes and beliefs throughout the workshop process;
  - Considering whether workshop length is sufficient to effect sustained change in teacher practice and student learning;
  - Supporting greater connections between PD and educators' everyday workloads;
  - Exploring strategies for building shared understanding of PD content among networks of teachers within schools; and
  - Exploring strategies for embedding supports that allow workshop leaders to acknowledge and adapt based on participants' diverse cultural contexts.



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## List of Abbreviations

Abbreviation	Definition
ATL	Approaches to Learning
CPE	Centre for Program Evaluation
DP	Diploma Programme
IB	International Baccalaureate
MYP	Middle Years Programme
OECD	Organisation for Economic Co-operation and Development
SJT	Situational Judgement Test
PD	Professional Development
PYP	Primary Years Programme
QA	Quality Assurance
UoM	(The) University of Melbourne
WSL	Workshop Leader



## This report

This report proceeds in the following sections:

- Section 1 provides a description of the background and design of the research project.
- Section 2 describes the research team’s work developing a program model to represent the IB’s professional development architecture, addressing Research Question 1: What does IB’s model for professional development look like in theory?
- Section 3 includes a literature review addressing Research Question 2: What does the research literature identify as critical features of high-quality professional development?
- Section 4 assesses the IB professional development model against these critical features, addressing Research Question 3: How do IB models compare to professional development best practices?
- Section 5 describes the findings from the third phase of the study, Outcome Study 1, addressing Research Questions 4 and 5:
  - What is the difference in teacher knowledge, attitudes and beliefs before and after participation in IB face-to-face workshops?
  - What is the difference in teachers’ levels of self-efficacy before and after participation in face-to-face workshops? What is the difference in schools’ collective self-efficacy before and after their teachers participate in face-to-face IB workshops?
- Section 6 concludes with a summary of key findings from Phases 1 to 3, and a more detailed description of proposed recommendations.

The methodology and data analysis for each research question is addressed in each respective section.



## Section I: Background & Design

In early 2017 the International Baccalaureate (IB) commissioned the Centre for Program Evaluation to conduct a study on the impact of the IB's professional development workshops with regards to participant pedagogical knowledge, attitudes, beliefs and instructional practices. The Centre for Program Evaluation (CPE) is a transdisciplinary research and evaluation centre based at The University of Melbourne (UoM) with more than 30 years' experience conducting research and evaluation.

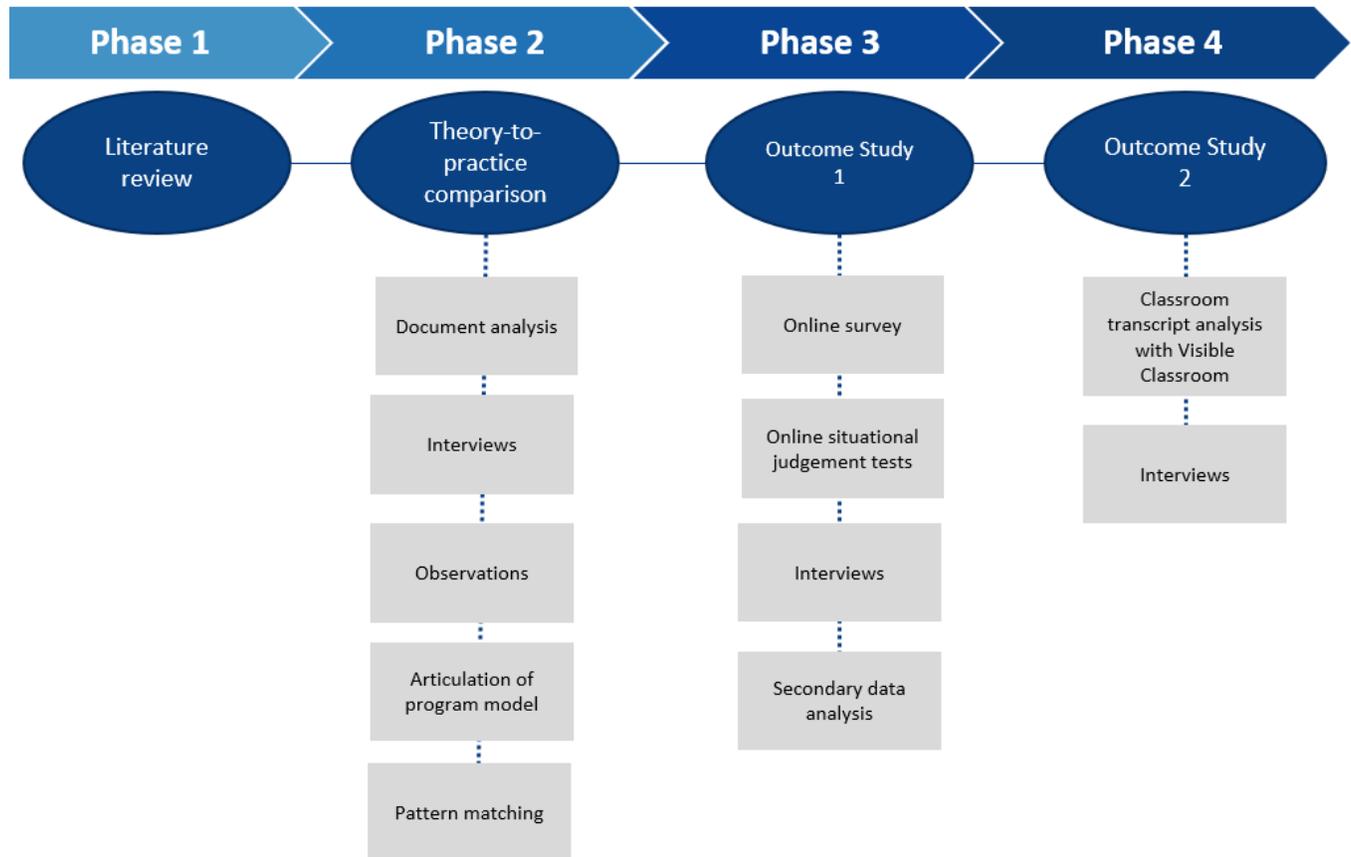
Between January 2017 and early 2019, CPE conducted this study, which addressed the following research questions:

1. **IB PD Model:** What does IB's model for professional development look like in theory?
2. **Critical Features:** What does the research literature identify as critical features of high-quality professional development?
3. **Theory-to-Practice:** How do IB models compare to professional development best practices?
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5. **Self-efficacy:** (a) What is the difference in teachers' levels of self-efficacy before and after participation in face-to-face workshops? (b) What is the difference in schools' collective self-efficacy before and after their teachers participate in face-to-face IB workshops?
6. **Instructional practice:** To what extent do workshop participants change or extend their instructional practices in ways aligned with the content and learning outcomes of IB face-to-face workshops, in particular their application of IB-related pedagogies? (b) To what extent are these changes to practice sustained over time?

To address the above questions, CPE conducted a multiphase mixed-methods study that incorporated four key phases: (1) a literature review; (2) a theory-to-practice comparison; (3) a pre/post non-equivalent comparison group outcome study; and (4) a repeated measures design that assessed changes in instructional practice over time (see Figure 2). CPE also used innovative technology to record classroom dialogue and examine changes in teacher practice after attending PD workshops.



Figure 2: Overview of the IB Professional Development Study Design<sup>2</sup>



<sup>2</sup> Stage 4 report to be submitted as a supplemental report.



## Section 2: The IB's Professional Development Model

This section of the report focuses on Research Question 1: **IB PD Model:** *What does IB's model for professional development look like in theory?* To that end, it describes CPE's outcomes with respect to the IB's professional development model.

### Background and Purpose

A critical starting point for this project was the articulation of the IB's professional development program model. Given the benchmarking exercise to be conducted under Research Question 3 (*How do IB models compare to professional development best practice?*), it was essential to gain a clear and accurate understanding of the IB's professional development model at the outset of the project. Only with this understanding would the research team be able to make appropriate comparisons between professional development best practice, as articulated in the literature, and the IB model.

In developing this model, the research team drew upon literature from the field of evaluation and, specifically, Chen's (1994) work on theory-driven evaluations. This work identifies two types of program model:

- Change model, which articulates the change that is expected to occur as a result of the intervention
- Action model, which articulates the activities, structures and personnel required to deliver the intervention itself.

Combined, these two models are said to articulate the connection between what a program *does* (i.e., its activities and accompanying organisational structures), and what it *hopes to achieve* (i.e., its intended outcomes and impact).

To that end, the research team has prepared a draft program model that comprises both an action model and a change model. An earlier version of this model was reviewed by, then updated based on feedback from, the Research Advisory Committee<sup>3</sup>.

This updated model is illustrated overleaf (see Figures 3, 4 and 5).

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<sup>3</sup> The Research Advisory Committee is a group of individuals with a wide range of experience and expertise relevant to this study. Its role is to provide feedback, advice and guidance throughout the life of the project. At present, the committee comprises members of the research team, IB staff, and school representatives who help make sure the research project is feasible, effective and credible.



Figure 3: IB Professional Development Change Model

IB Professional Development: Change Model

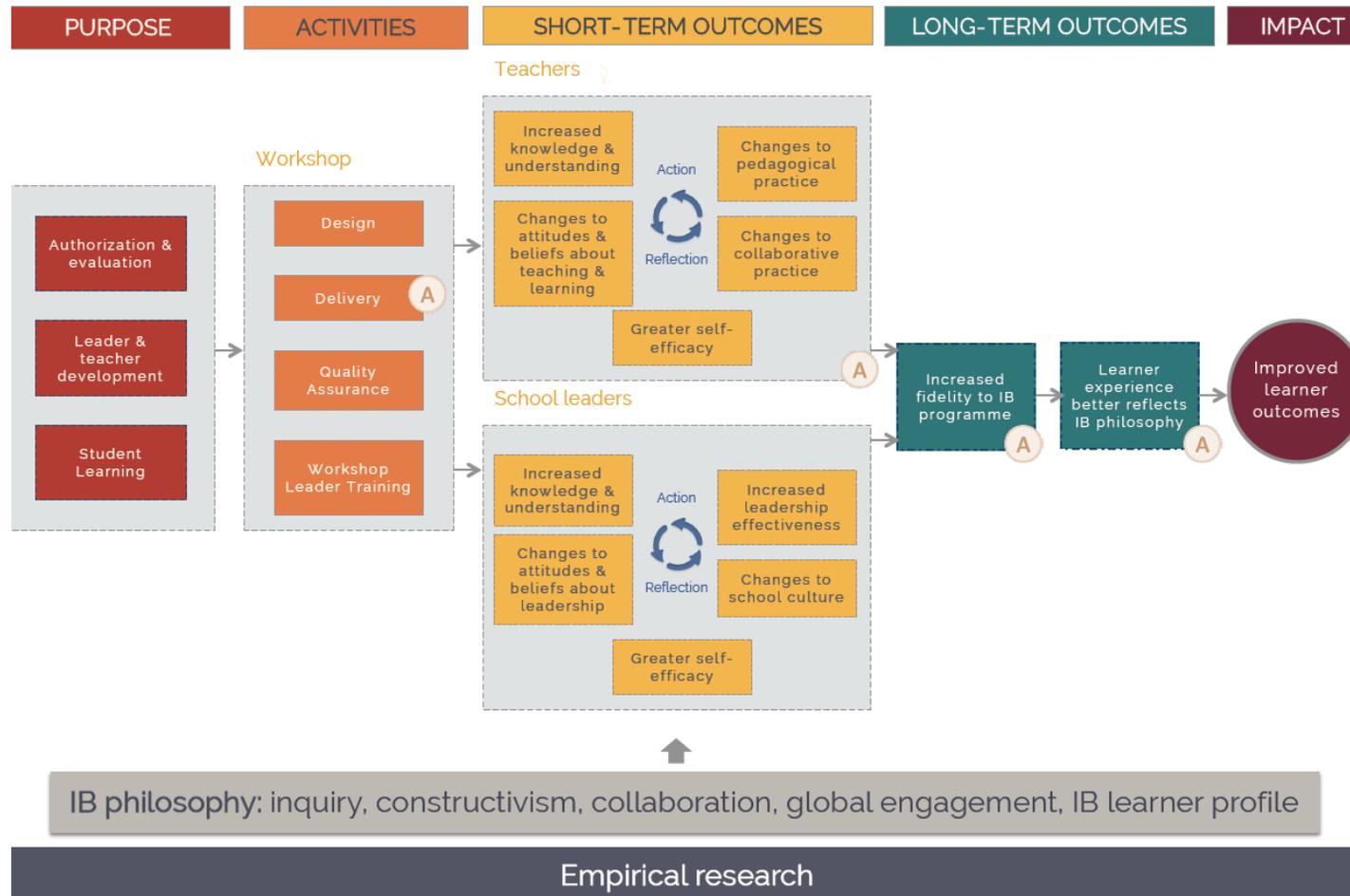




Figure 4: IB Professional Development Action Model

IB Professional Development: Action Model (Activities)

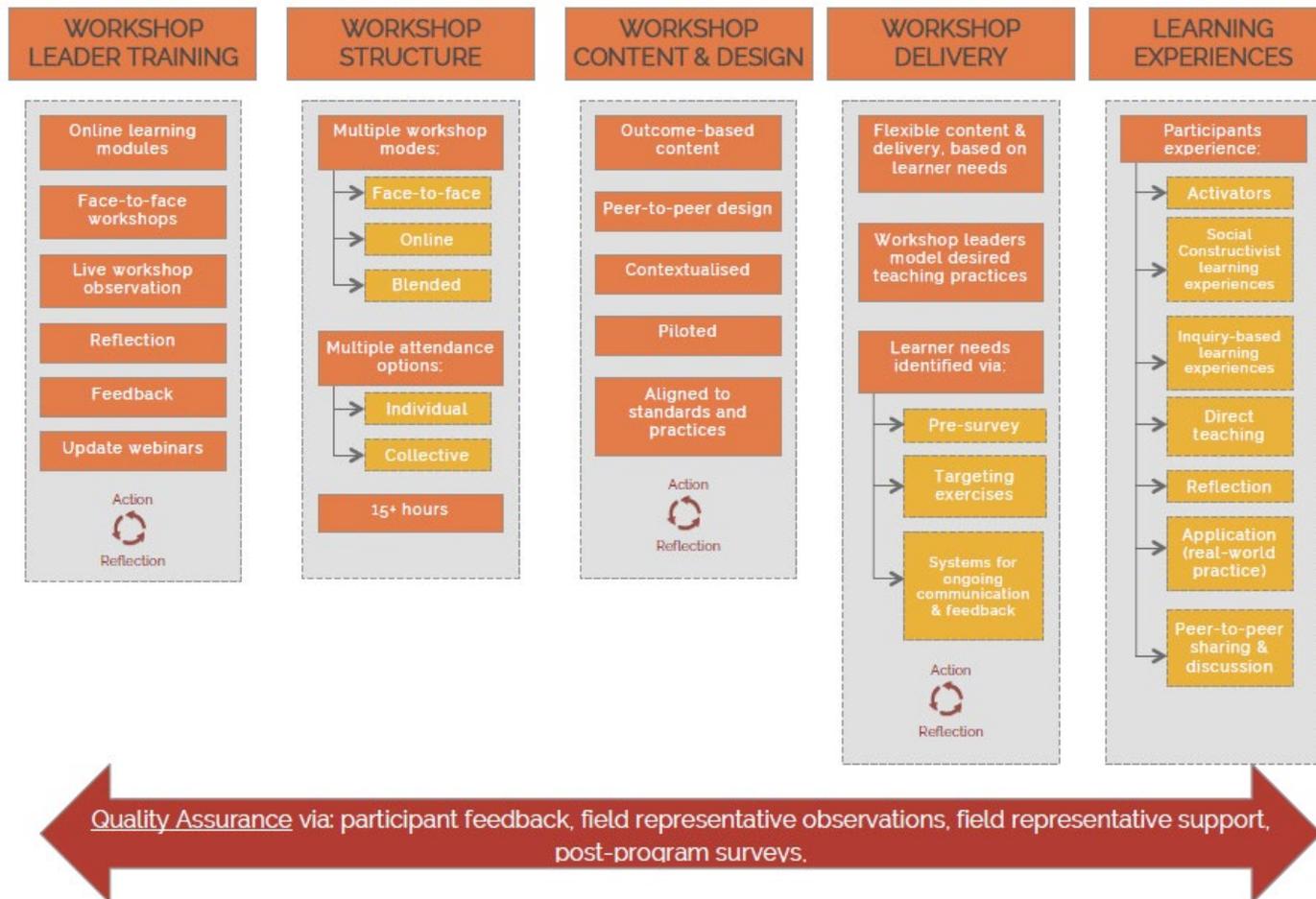




Figure 5: IB Professional Development Change Model Assumptions and External Factors

### Assumptions

- A Participants are willing to attend workshops and are open to changing attitudes, practice
- A Participants share what they learned at PD workshops with others at their schools
- A Participants (teachers, leaders) are *able* to make relevant changes; their environments (school, local, national) are conducive to the requisite changes
- A Increased fidelity to IB standards and practices leads to learner experiences that better reflect the IB philosophy
- A Increased fidelity to IB standards and practices leads to improved learner outcomes

### External factors

- e School factors (e.g. resourcing, school type, background, partnership status, authorisation status)
- e Local & national educational systems (e.g. assessment requirements, national policies)
- e Country contexts (e.g. local economy, historic approach to education, cultural practices)



## Process

This version of the program model was developed through a four-part process:

1. Collection of background data on the IB's professional development work through review of IB documentation, key informant interviews and observations.
2. Preparation of a draft program model.
3. Collection of feedback from the Research Advisory Committee.
4. Revision of model based on the Research Advisory Committee Feedback.<sup>4</sup>

As such, Figures 3-5 reflect the revised, adapted model, based on the Research Advisory Committee feedback.

Key elements of these models are described below.

## Change Model

This change model is intended to be read from left to right, with 'purpose' informing 'activities'; activities leading to 'short-term outcomes'; short term outcomes contributing to 'medium and long' term outcomes; and finally, long-term outcomes contributing to 'impact'.

Underlying the broader model are two additional elements, intended to represent the foundations of the IB's professional development work: empirical research (such as a constructivist epistemology and inquiry-based pedagogies) and the IB philosophy. The inclusion of these two elements reflects the understanding that the IB's professional development model is grounded in and informed by the IB's guiding philosophy. This philosophy in turn is grounded in and informed by empirical educational research.

The A icon, incorporated at four points on the change model, indicates the presence of an 'assumption' at that phase of the design, delivery or change process. These assumptions are expectations, often unstated, about how activities will be delivered or how change will occur. Often, successful program implementation or change processes rely on these assumptions being realised. Assumptions specific to the IB professional development model are listed and described in more detail in Figure 5.

*Purpose.* The underlying purpose behind the IB's professional development model is three-fold: (1) to support schools in their authorisation and evaluation processes; (2) to enhance leader and teacher development and practice; and – most importantly – (3) to enhance student learning.

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<sup>4</sup> In this way, the current model represents what Chen (1994) calls a *stakeholder theory*. The model is based on the IB's understanding and expectations about how and why change occurs, rather than broader social science or educational theories.



*Activities.* At the heart of the IB's professional development work is the professional development workshop. Workshop implementation occurs through practical, logistical and andragogical preparation, including workshop: (1) design, (2) delivery, (3) quality assurance, and (4) training for workshop leaders. These four elements are described in more detail within the action model and are consistent with the research findings (see Section 6).

*Short-term outcomes.* There are two streams of change expected under the IB's professional development model, targeted towards the two primary audiences for the IB's professional development work: (1) teachers, and (2) school leaders.

- **Teachers:** For teachers attending professional development workshops, it is expected that participation will lead to increased knowledge and understanding—both in relation to teaching and learning in general, as well as the requirements for teaching within an IB programme. After attending professional development workshops teachers are also expected to review and reflect on their attitudes and beliefs about teaching and learning (for example, what counts as good teaching, how effective learning occurs); and feel an increased sense of self-efficacy with respect to the pedagogical practices encouraged during the workshop. In time, it is expected that teachers will also improve their pedagogical practices in ways that reflect those that were modelled throughout the workshop; and the nature of their interactions with other teachers at their own schools. Working collaboratively with teachers within the school is seen as the *sine qua non* of continuous improvement. Each of these five features is expected to interact with one another through a cycle of action and reflection.
- **School leaders:** For school leaders, a similar cycle is expected. That is, school leaders participating in professional development workshops are expected to: (a) have increased knowledge and understanding about leadership generally and, more specifically, their own leadership capabilities; (b) more positive attitudes and beliefs about effective leadership; and (c) increased feelings of self-efficacy relating to the leadership practices emphasised in the workshop. These individual changes are in turn expected to shape: (d) the effectiveness of that person's leadership; and (e) the nature of the school climate and culture. Again, these five features are expected to interact with one another through a cycle of action and reflection, with each change contributing to others in a virtuous cycle.

*Medium-to-long term outcomes and impact.* As a consequence of the above changes, it is further expected that changes in teacher and leader knowledge, attitudes, beliefs and practice will positively influence the program such that:



- There is increased fidelity to the IB programme. That is, teachers are better equipped to (and do) meet the requirements of the relevant IB programme, both in terms of the standards and practices and the broader intent behind the programme documentation.
- Learner experiences better reflect the IB philosophy and programme learner goals. As teachers and leaders more consistently implement the intended IB programme, it is expected that learner experiences will also change to better reflect the intentions behind the IB philosophy.
- There are improved learner outcomes, as aligned with the IB philosophy and mission, and the specific IB programme.

## Action Model

The action model is also intended to be read from left to right. The model incorporates additional detail on how the activities included within the IB's professional development model are expected to be implemented. This includes:

*Workshop Leader Training.* Critical to the delivery of the IB's professional development work are Workshop Leaders (WSL). Under the IB model, workshop leaders undergo a rigorous and consistent training process including:

- *Online learning:* including an understanding of online pedagogies
- *Face-to-face workshops:* five-day workshops with a strong focus on modelling key principles of the IB Approaches to Learning (ATL) as well as the principles of effective andragogy.
- *Live workshop observation:* providing critical feedback from participants and observers and field representatives (potentially phasing out under the new workshop leader training).
- *Feedback:* with opportunities for workshop leader reflection based on triangulated feedback and, under the new training approach, from a mentor who is assigned to assist new workshop leaders through their first workshops and provide constructive feedback that supports continuous improvement.
- *Update webinars:* ensuring content is up-to-date and challenges associated with leading workshops are shared and discussed.

Underpinning this training, and throughout the WSLs' work, it is expected that they will undertake ongoing and continuous reflection on their work, adapting based on feedback to enhance the quality of their workshop delivery.

*Workshop Structure.* Since 2010 the IB has implemented a **three-tiered** professional development system (Category 1, Category 2, Category 3) in which each workshop tier has its own goals and objectives and targets educators with a range of IB experiences. Category 1 workshops target schools that are preparing to apply for IB authorisation and educators who are new to IB schools. Category 2 workshops focus on programme delivery for experienced IB educators, and Category 3



workshops provide an opportunity for experienced educators to engage in in-depth investigation on topics of interest to deepen understanding and expertise. Within this general structure, IB professional development workshops also have the following features:

- **Multiple workshop modes:** Potential professional development participants can select from multiple delivery modes, allowing IB schools to ‘choose the best fit’ (Tait & Richards, 2017) for their needs. In this way, PD participants can choose from:
  - Regional face-to-face delivery (in person, delivered over 2-3 days, with educators from across the globe);
  - In school face-to-face delivery (in person, delivered over 2-3 days and targeted towards school-specific issues and building shared understanding of the topic);
  - Online delivery (in which participants complete online workshop sessions over a four-week period); and
  - Blended delivery (in which participants complete both online sessions and face-to-face sessions).
- **Multiple attendance options:** Given these many delivery options, there are also options in the modes by which educators participate in professional development workshops. Regional face-to-face workshops, online workshops and blended workshops can all be attended either individually or collectively with a team of educators from the same school. In school workshops are typically attended by a team of educators from the same school.
- **Minimum 15 hours:** All PD workshops have a minimum of 15 contact hours, with contact time either distributed over 2-3 days or a four-week period for online workshops.

*Workshop Content & Design.* Workshop content is **based on the standards and practices**, as articulated in IB documentation, and seeks to deepen participants’ understanding and application of those standards and practices within the classroom. Workshops appear to be designed around a standard structure and architecture to ensure the IB can provide an aligned and consistent set of workshops to the IB community. In this way, workshop guides are designed using a **peer-to-peer model** in which IB practitioners produce outline of the session goals, objectives, topics and required experience needed to run the workshop effectively. This peer-to-peer design process ensures that expert practitioners are providing contemporary and relevant input to ensure that the IB’s PD can provide **contextualised** practical opportunities for participants to reflect upon.

New workshops also undergo a process of peer-to-peer feedback and are assessed to ensure they align with the relevant standards, practices and philosophy. Workshops are **piloted**, reviewed, adjusted and then implemented. The performance of each workshop is evaluated for quality and impact through the quality assurance framework to allow for ongoing and continuous improvement.



*Workshop Delivery.* Workshop delivery is focused not only on content but also **modelling** the learning and teaching practices associated with an IB education (e.g., inquiry-based, social constructivist). Importantly, attention is given to the **needs of the learner** and attempts to build learners' capacity to differentiate teaching practices to maximise student growth. Specific learner needs are identified via: an informal pre-survey (i.e., informal in that there is no standardised template); within-workshop targeting exercises (e.g., discussion, ranking exercises) that allow the workshop leader to identify participants' critical interests and needs; and within-workshop systems for ongoing communication and feedback (e.g., 'issues bins').

*Learning experiences.* While attending each workshop, it is expected that participants will experience a range of learning experiences, consistent with the IB's philosophical foundations and underpinnings. These include:

- **Activators:** Exercises that activate participants' prior knowledge.
- **Social constructivist learning experiences:** Opportunities for participants to construct their own understandings of content and concepts, as well as collaborating with others to test out theories and models of learning outcomes.
- **Inquiry-based learning experiences:** There are many ways in which adults can engage in inquiry and there is an expectation that participants will have the opportunity to engage in the inquiry cycle and reflect on their learning as it might apply in their classrooms
- **Direct teaching:** Short periods in which the workshop leader explicitly instructs participants on a relevant topic.
- **Application:** Opportunities for workshop participants to apply the theory of what they have learned into practice; for example, through role plays or the development of practical materials (e.g., a unit plan) that can be directly applied to their school contexts.
- **Peer-to-peer sharing and discussion:** Opportunities for participants to share and collaborate with one another, building understanding of what happens at other schools, and capitalising on other educators' experiences.

As with the WSLs, it is expected that workshop participants will also be given—and will take up—opportunities for ongoing and continuous reflection on their work, adapting understanding, beliefs and practice to enhance the quality of their teaching or leadership practice.

*Quality Assurance.* This is a data-driven feedback and quality assurance mechanism designed to ensure a continuous improvement approach to professional development. The Quality Assurance Framework draws upon the triangulation of feedback from participants (via an immediate post-workshop survey), workshop leaders, field representatives and observers.



## Section 3: Literature Review - Critical features of high-quality professional development

This section of the report focuses on Research Question 2: **Critical Features:** What does the research literature identify as critical features of high-quality professional development? To that end, it provides a summary of the research team's findings from its literature review on critical features of high-quality teacher professional development. Additional detail about the review's methodology can be found in Appendix 1.

What does the research literature identify as critical features of high-quality teacher professional development?

Teacher quality is consistently linked to student performance across a myriad of academic and non-academic areas of development. After reviewing over 1,200 meta-analyses on student achievement, Hattie (2012) concluded that teacher practice is the largest in-school variable influencing students' academic performance; his research confirming a large corpus of research (see, e.g., Hallinger, Heck & Murphy, 2014; Hanushek & Rivkin, 2012). Leigh (2010) found that students with effective teachers are able to learn in half a year what students with less effective teachers accomplish in one. And the converse is also true with Darling-Hammond (2000) warning that the 'effect of poor-quality teaching is debilitating and cumulative' (p. 2). The need and importance of teachers being engaged in ongoing learning is summarised in a simple phrase from Timperley Wilson, Barrar, and Fung (2007): 'because teaching challenges do not remain static' (p. 1).

Professional development refers to the 'processes and activities designed to enhance the professional knowledge, skills and attitudes of educators so that they might, in turn, improve the learning of students' (Guskey, 2000, p.16). Research has shown that professional development can have a large impact on student performance. For example, both Timperley *et al.* (2007) and Phillips, McNaughton and MacDonald (2001) found significant improvements in student test results following teacher engagement in PD. These improvements equated to students progressing at twice the rate of their previous results. In these studies, students learned in one year what would have previously taken them two, highlighting the potential of PD to improve teacher effectiveness and enhance student performance.

Education departments and school systems throughout the world have increasingly invested in teacher learning and development, aiming to align teaching practices with the most recent educational and pedagogical research, and, ultimately, improve student learning outcomes. Despite the importance of teachers' ongoing learning and development, many education systems struggle to implement programs that actually improve teaching practices and student outcomes (Jensen, Hunter, Sonnemann, & Cooper 2014). Relatedly, many teachers believe that PD fails to meet their needs, with over half of



the teachers surveyed by the Organisation for Economic Co-operation and Development (OECD, 2009) reporting that they wanted to participate in higher quality PD more frequently.

The primary purpose of this review is to examine the characteristics and critical features of high-quality PD programs for teachers. This section of the report begins with an overview of approaches to PD evaluation, followed by summaries of nine critical features of effective PD. The report concludes with a discussion of other trends in professional development.

### Measuring teacher professional development effectiveness

Understanding the methods used to evaluate various teacher professional development programs is a useful first step in contextualising critical features of effective professional development because of the range of measures and outcomes used to determine effectiveness. Guskey's (2000) seminal work describes five levels of professional development evaluation, based on the earlier work of Kirkpatrick (1959):

- Participants' reactions
- Participants' learning
- Organisation support and change
- Participants' use of new knowledge and skills
- Student learning outcomes.

While the fifth level (student learning outcomes) is considered by many to be the 'gold standard' measure by which to evaluate teacher professional development, Guskey (2005) maintains that each level provides unique information that can be used for formative and summative assessment of programs. Each level is also seen to build on the level before in a linear fashion. Guskey (2000) proposes that student learning outcomes cannot be improved by professional development unless teachers use their new knowledge and skills, which in turn must be supported by staff at organisational levels, and so on.

Another element of professional development evaluation to consider when reviewing evidence on critical features, is the extent to which the research focuses on determining *effectiveness* rather than *efficacy*. Efficacy trials of professional development programs typically involve the program creators or a select group of teachers delivering the program in a controlled environment, with a view to providing initial evidence that an approach shows potential. In contrast, effectiveness studies examine programs in 'real world' conditions; teachers from a range of schools and backgrounds are included to show effectiveness in a range of contexts and settings (Bruce, Esmonde, Ross, Dookie, & Beatty, 2010). It has been observed that much is known about professional development delivered in conducive settings by the program's designers, but considerably less is known about the same programs when delivered in a range of settings by multiple trainers (Wayne, Yoon, Zhu, Cronen, & Garet, 2008).



Finally, recent attention has focused on the sustainability of change to teacher practice following professional development programs. Many evaluations of teacher professional development seek to measure impact immediately after program implementation. However, few studies examine the long-term benefits and effects of PD programs (Antoniou & Kyriakides, 2013). Studies that do include follow-up data on program effectiveness generally include short retest periods of as little as four weeks, and others do not find that key outcomes are maintained past a certain period of time (Rose & Church, 1998). Wayne *et al.* (2008) propose that the timing of outcome measurement is important because any impact on student achievement may take time to develop as teachers gradually change their practice over time. Given the desire for professional development to have a lasting impact, evaluation studies that include measures of sustainability could be considered to provide more robust evidence of effectiveness.

### Impact

Despite the extensive literature on professional learning, and the large amounts of money invested into PD programs, there is limited research on how teacher PD impact student outcomes. Cole (2012) notes that when the terms 'professional development' and 'in-service education' were searched in an educational database over 34,000 articles were retrieved; however, when Timperley *et al.* (2008) were looking for articles specifically related to PD and student outcomes, only 97 were sourced. Despite the apparent lack of research into the influence of PD on student learning, it remains the gold standard for assessing the effectiveness of PD programs. As the ultimate goal of PD is to enhance student performance, through the transference of skills and knowledge to their teachers. Importantly impact is more than just students' test scores, and relates to progression on a range of social, emotional and academic factors.

### Critical Features of High-Quality Teacher Professional Development

While there is considerable variation in the many PD programs available to schools across countries and contexts, it is possible to determine a range of common elements that are considered to be critical features of high-quality and effective teacher PD. Research over the past thirty years has sought to elucidate these features; and while some elements of effective PD appear to have achieved consensus among researchers, the implications of some factors remain unclear.

#### **Sustained Length**

Unsurprisingly, the total time and duration of PD programs have been repeatedly cited as key determinants of program impact (Blank & de las Alas 2009; Timperley *et al.*, 2006; Darling-Hammond *et al.*, 2012). One of the earliest studies that linked professional learning with student performance found that the amount of time teachers spent in PD was critical to student outcomes (Carpenter, Fennema, Peterson, Chiang, & Loef, 1989). The study, which examined mathematics teaching in US first



grade teachers, found that student assessment results were significantly higher after their teachers had participated in 80 hours of PD, relative to students whose teachers received a 4-hour program. Since 1990, articles such as 'Changing Teaching Takes More Than a One-Shot Workshop' (Goldenberg & Gallimore, 1990) have appeared in educational journals, making program length one of the earliest and most thoroughly studied characteristics of effective PD.

Recent literature provides further support to the notion that the more time teachers spend in PD, the greater the impact on teacher practice and student achievement. In a review of nine PD studies, Yoon and colleagues (2007) found that teachers who participated in lengthy PD programs, an average of 49 hours across the studies, had a mean improvement in student achievement results of 21 percentile points. However, the three studies reviewed which involved fewer than 14 hours of PD showed no significant effects on student achievement. Similarly, Blank and de las Alas' (2009) meta-analysis of 16 studies found that experimental PD programs averaged a total of 91, with longer programs typically associated with higher effect sizes. However, the most consistent effects on teacher practice are generally found when program participation is over 100 hours (Banilower, Heck, & Weiss, 2007). An additional advantage of PD courses with a high number of participatory hours is that they typically occur over a longer time span, which is also believed to influence program effectiveness.

Programs which occur over a period of time have been found to be more likely to influence teacher practice. Timperley *et al.* (2007, p.30) note that 'in most circumstances, an extended timeframe is needed for substantive learning to occur', arguing that professional development programs typically need to be long term, with frequent contact, to attain the desired change in teacher practices. However, these types of courses are not always achievable or necessary, and short workshops may be sufficient for targeted goals (Timperley *et al.*, 2007). For example, teachers given a one-off hour-long training session on diagnosing and responding to students with auditory problems were found to significantly improve students reading abilities relative to controls (Rowe, 2006). However, this is the exception rather than the rule, and one-off programs are not typically associated with change in teacher behaviours and student outcomes (Timperley *et al.*, 2007; Blank & de las Alas, 2009).

Time is the most salient barrier to teachers engaging in effective professional learning which, as already acknowledged, demands a high number of hours over a long period. The time that teachers spend in PD often means that they perceive that they have to sacrifice time with students or planning lessons. In the global review of high performing PD systems (Jensen *et al.*, 2016), the authors noted that teachers in the top performing countries typically spent less time in the classroom thereby giving them more time for PD, as well as lesson planning and marking. Interestingly, there was one outlier in the report's review, with teachers in British Columbia having high levels of class time, despite the high performing professional development program. However, the report notes that teachers in British



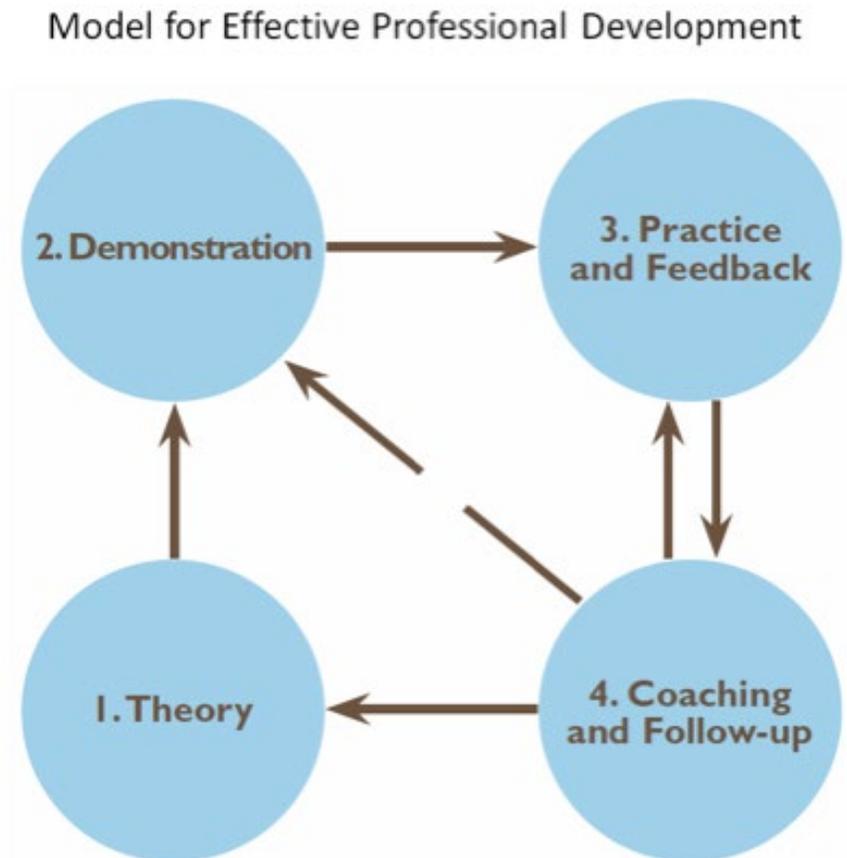
Columbia are typically allocated 1 to 2 periods per week of professional learning, and that this is sufficient to maintain the province's high PD standards.

Similarly, Jensen (2014) evaluated high-quality PD programs in several Australian schools and found that programs may be able to overcome the issue of teacher time by ensuring that some professional learning time is embedded within teachers' and schools' standard practice. This report also looked at practical ways in which teacher time can be re-organised to create more space for professional development; for example, administrative meetings and training programs could be put online, giving more time for teaching related learning. Collectively, these articles suggest that if schools and educational organisations prioritise PD and ensure that some professional learning time is embedded within teachers' and schools' standard practice, they may be able to lessen the burden on teachers whilst maintaining the delivery of high-quality PD.

### ***Integrate Practice and Feedback***

One of the biggest criticisms of teacher PD programs is the lack of feedback and support given to teachers in the process of implementing the content, ideas and practices learnt in PD. There is a substantial amount of research on the importance of feedback when learning and implementing new skills (Hattie, 2008). As Guskey (2002) notes, "change is a gradual and difficult process for teachers" (p. 368), and ongoing engagement and support is essential to teachers' effective implementation of new practices. Feedback is a central feature in Cooper's (2004) PD model, presented in Figure 6 overleaf, which claims that an interactive and iterative cycle of teacher practice and feedback is essential for behaviour change. Truesdale (2003) experimentally tested this idea, by comparing teachers who had attended the same workshop, giving only some feedback during implementation. This study found that the teachers who had no ongoing support soon lost interest in the ideas presented in PD, while those who received additional support were more likely to change their teaching practices. Unfortunately, teachers rarely have the opportunities for feedback and follow up after their participation in PD. While there are some examples of PD programs which incorporate ongoing feedback (Timperley, 2006), Ingvarson, Meiers and Beavis (2005) found that few participants across several programs reported feedback when they were beginning to implement the strategies they had learnt in PD. The time demands of PD will be discussed further in the following section, which outlines the barriers to teachers receiving quality PD.

Figure 6: Model for Effective Professional Development



These findings are consistent with broader literature on deliberate practice, a concept that has emerged from the field of expertise research. Defined as repeated performance of critical tasks, and designed to stretch one's capabilities beyond current levels, deliberate practice has been shown to be the training variable most closely related to objective performance across a wide range of domains (Ericsson, 2009) including music (Ericsson, Krampe, & Tesch-Römer 1993), sports (Ward, Hodges, Williams & Starkes, 2004), chess (Charness, Krampe, & Mayr, 1996), aviation (McKinney & Davis, 2004), medicine (Ericsson, 2009) and even education (Deslauriers, Schelew, & Wieman, 2011). For example, experimental training programs informed by deliberate practice have been shown to improve decision-making by laparoscopic surgeons (Ericsson & Poole, 2016), military commanders (Lussier *et al.*, 2003) undergraduate physics students (Deslauriers *et al.*, 2011), and classroom educators (Fadde & Sullivan, 2013; Sherin & van Es, 2005).



In short, much of the research on expertise suggests that individuals improve on specific tasks when they have repeated opportunities to engage in deliberate practice that:

1. Is designed and overseen by people who are familiar with the nature of expert performers in a particular domain.
2. Occurs outside the student's comfort zone, meaning the student is constantly required to try things just beyond their current abilities.
3. Involves repetition, where skills are practiced repetitively rather than in their naturally occurring frequency (Lussier *et al.*, 2003).
4. Targets well-defined, specific goals rather than overall performance
5. Has a stop and start nature, where exercises are a series of short performances rather than one long, continuous flow (Lussier *et al.*, 2003).
6. Involves targeted feedback.
7. Incorporates an immediacy of performance, where students are given the opportunity to practice immediately after receiving targeted feedback (Lussier *et al.*, 2003).
8. Builds and supports effective mental representations (Ericsson & Poole, 2016).

### **Job-embedded**

Increasing the time and length of PD is important for improving program outcomes, but how and where that time is spent is equally important. French (1997) believed that teachers require up to 50 hours before practice change takes place but noted that this practice must include elements of instructing, practicing and coaching before a new skill or approach is mastered to a level where it can be implemented in a class. Relatedly, Joyce and Showers (2002) claimed that teachers need, at minimum, 20 separate practices to master a new skill, with this number increasing with the complexity of the task. Evidence suggests that teachers must be supported in translating the knowledge and skills gained through PD programs into the classroom environment to implement and sustain changes to practice (Guskey, 2002; Joyce & Showers, 2002). For this type of PD to be sustained, a culture of professional learning must also be embedded across educational organisations and schools.

Job-embedded practice involves extending PD learning from seminars and staff rooms into 'real world' classroom settings. Professional development commonly involves short seminars or workshops outside of the classroom; however, research has shown that even seemingly high-quality workshops presented by experts can be difficult for teachers to translate to the classroom. An experiment involving experienced science teachers working with experts on inquiry learning found that, despite observing lessons, teachers had difficulty implementing these ideas within their own classrooms (Ermeling, 2010). Victorian Government recommendations for teacher PD state that programs should be school-based, and highly related to the daily work of teachers to be maximally effective (DET,



2005). An example of this type of PD comes from Canada (Bruce, Esmonde, Ross, Dookie, & Beatty, 2010), where K-6 teachers participated in classroom-embedded PD related to mathematics. In two-day sessions taking place six times per year, teachers collaborated by co-planning and teaching lessons together. Rather than being a 'one-off' occurrence, teachers then analysed student work samples from the lessons they taught and made modifications accordingly before teaching the lesson again.

This type of PD functions best when it is part of an organisation's overarching strategy and integrated into daily operations and organisational culture. In a review of innovative companies and PD institutes, professional learning was often found to be a core component of their workplace culture and organisational strategy (AITSL, 2014). In these cases, employees saw PD as a central part of their role, and not an additional or separate component of their workload. In this way, the research literature suggests that professional development is most effective when it is not viewed as separate to participants' everyday work; rather, it is embedded into their existing workload and work days. However, a major challenge to the uptake of sustained job-embedded PD is its impact on school budgets and, crucially, teaching time. Wayne *et al.* (2008) observed that increasing the length of PD often requires teachers to be out of the classroom, which teachers perceive to be disruptive to student learning. Similarly, PD that occurs in the classroom typically involves coaches or mentors working with teachers, which can be expensive.

However, the most effective, in-school professional learning has a strong and clear alignment with the school's improvement plan. The focus is, also, unequivocally on student learning. Schools with a focus on student learning will ensure that they assess students' learning to identify their next stage of learning; they then develop appropriate evidence-informed pedagogical strategies to meet the needs of the individual learner. Professional learning is therefore determined by the needs of the student and the appropriate skills of the teacher to adjust and adapt pedagogical strategies, and then is evaluated in terms of the impact on student outcomes (Jensen, *et al.*, 2016). Such a cycle ensures that student learning is at the centre of PD and that the PD is targeted to meet the needs of the individual teacher to more effectively improve the learning of all students. In this way, the school builds collective responsibility and accountability for the learning of students.

### **Ensure Coherence with Curriculum and Content**

Related to job-embedded teacher PD is the idea that programs should relate to the current school curriculum and the teacher's specific subject areas. A common feature of effective PD programs according to Timperley *et al.* (2007) is the link between PD focus and curriculum outcomes. Over three-quarters of the PD studies reviewed by Timperley *et al.* (2007) justified the nature and content of the PD programs in question by referring to national (US) standards. Taken together with the recommendation that PD should be job-embedded, this recommendation reflects the need for PD to be



directly relevant to the everyday practice of teachers for it to be implemented in the classroom, and ultimately improve student outcomes.

Programs that target a teacher's specific subject area are often more successful than those which focus on more general pedagogical and teaching skills. Kennedy (1998) found that PD courses focusing on content, as well as the ways in which students learn that content, were effective in improving participants' teaching practices. In contrast, more general programs addressing pedagogy were less likely to show sustained behaviour change. More recent work by Desimone and Garet (2015) also supports the idea that PD should be content focused but highlights that programs must focus on both subject matter as well as how students learn that content. The focus on student learning is essential, given the finding that teachers' content knowledge has virtually no effect on student achievement (Hattie, 2009). As such, the focus should be how students learn the content rather than just what the content is. Finally, research has shown that teachers themselves prefer PD to be specific to the curriculum that they teach, reporting higher levels of satisfaction with these courses than with more generic teaching workshops (Darling Hammond *et al.*, 2009).

### ***Professional Development as a Collective Endeavour***

Effective teaching does not occur in isolation and improving the performance of both students and teachers requires collaboration amongst teachers, students, parents and school leaders (Hattie, 2015). A large body of recent research signalling that student learning outcomes improve when schools function as effective learning communities has important repercussions for PD programs and research. A recent shift in thinking, informed by education research, has led to what Michael Fullan terms the de-privatisation of teacher practice (Fullan, 2007), which involves teachers sharing knowledge about their practice and working together to improve instruction.

The importance of teacher collaboration has also been highlighted in the work of Hattie as the 'new number one' effect on student achievement listed in his *Visible Learning*, citing a study exploring collective teacher efficacy (Eells, 2011). Collective teacher efficacy refers to teachers' shared belief that they can be effective in improving outcomes for all students and overcome potential barriers to achievement and progression. There is evidence to suggest that this approach benefits students, with both Bolam *et al.* (2005) and Louis and Marks (1998) finding student achievement was significantly higher in schools with strong professional learning communities. Research has also shown there to be a relationship between PD and teacher collaboration. Ingvarson *et al.* (2005) identified collaboration to be a mediating factor of PD and teacher practice, finding that high teacher collaboration typically strengthened the effectiveness of quality PD. Understanding the defining features of effective collaboration is an important pre-condition of this outcome.



While many professional development programs focus on building the capacity of individual teachers, it is important that the focus shifts from helping individuals be more effective in their isolated classrooms, to creating a collaborative culture of interdependence and shared responsibility.

Building collaboration into PD is recommended by a range of policy documents, reviews of evidence and experimental studies. A recent example comes from Desimone and Garet (2015) who included collective participation as one of their five features of effective PD. They defined collective participation as teachers coming together to participate in PD programs as part of an interactive learning community. Another recent review of teacher PD found that teacher collaboration is seen by researchers and practicing educators to be a key element of improving teacher learning and effectiveness (Caena, 2011). In a large randomised controlled trial involving 39 US high schools, the diffusion of knowledge from PD participants to their colleagues was in some cases almost equal to the direct effects of teacher participation in the PD (Sun, Penuel, Frank, Gallagher, & Youngs, 2013). The study also found that participation in PD is associated with the provision of more instruction-related help to colleagues. Collectively, these findings provide strong evidence for the potential of collaborative professional relationships to improve teacher practice and, subsequently, student outcomes.

However, not all teacher collaboration translates to improved student learning outcomes. Teacher collaboration can be considered in two broad categories: (1) Active, which involves teachers working together on teacher related tasks, e.g., teaching a class together, observing and providing feedback on lessons; and (2) Administrative where teachers work together on logistical issues and school administration, e.g., timetabling (Jensen *et al.*, 2014). Only active collaboration has been found to improve student outcomes (Jensen *et al.*, 2014; 2012); another study found that teachers engage in far more administrative than active collaboration (OECD, 2009). A review of high performing PD educational systems showed that these systems facilitated, and in some instances mandated, active teacher collaboration within the context of PD (e.g., PD through mentoring). These programs tended to be most successful when teachers were matched on their subject areas, and when programs featured observation and feedback. While educational systems have a key role in facilitating and promoting professional communities, schools and school leaders are also essential in creating and maintaining these shared learning environments.

### ***Ensure Engaged and Effective School Leadership***

School leaders are integral to the implementation and maintenance of quality teacher learning and development. School leaders are typically responsible for arranging PD and must not only ensure that teachers are participating in PD, but that it targets their concerns and builds upon their established skills and abilities. Timperley *et al.* (2007) noted that active school leadership was essential for effective PD implementation, and that school leader PD participation could be placed into three



categories: (1) arrange quality and relevant PD for teachers; (2) develop a culture of learning within the school, whereby they also participated in learning and development, and (3) set visions for long term PD outcomes, by ensuring PD is ongoing and that there are mechanisms in place to assess its effectiveness. These different types of leadership engagement were not directly contrasted; however, PD is most effective when it is one facet of a broader school improvement plan, which prioritises learning and development (Calnin, 2006).

Increasingly effective leadership practices include leaders participating in, not just organising professional learning. Robinson (2011) cites this as the leadership behaviour with the greatest effect size in her study of effective leadership. Hattie (2015) argues that leaders need to build teacher instructional skills through 'collaborative expertise' (p. 23). Fullan (2015) builds on this theme of capacity building by arguing that the primary strategy for leaders is to build collaborative cultures; he argues that leaders don't need to have mastery but need to have a genuine drive to develop mastery in leading pedagogy and *deep learning alongside* teachers as a group that makes impactful school leadership' (emphasis added).

School leaders facilitate how teachers engage in PD programs and can foster both positive and negative professional learning communities. There are robust links between collective efficacy in a school and the efforts of school leadership to influence the attitudes and culture of the school (Derrington & Angelle, 2013). Cole (2012) argues that school leaders' attitudes and beliefs also influence effectiveness and can, for example, inadvertently undermine PD by presuming that teachers will not change. Cole (2012) also claims that school leaders who are sceptical about the efficacy of PD will not only be less active in sourcing and implementing PD programs but may transfer their negative attitudes onto their teachers. Similarly, Johnson and Stringer (2005) argue that school leaders 'drive the improvement process' (p. 32) and have the potential to create a school environment where professional learning is implemented effectively and valued by participating teachers. Calnin (2006) concludes that school leaders need to "prioritise professional learning and provide appropriate resources" (p. 10) and argues that school leaders must build the social infrastructure for effective PD within the constraints of their resources.

A further challenge for leaders is the finding (Jensen, Robert-Hull & Hunter 2016) that the greatest effects of PD occurred when it 'challenged teachers' thinking and conceptions about student learning and engaged them sufficiently to develop their knowledge and skills in ways that improved student outcomes' (p. 8). The authors note that this type of PD needs to take place over an extended period of time and is strengthened by external expertise.

*School Context.* Much of the research into teacher effectiveness focuses on the individual teacher's skills and dispositions. Jensen *et al.* (2016) also note the importance of the learning community and the collective self-efficacy found within the group. What is less well documented in relation to professional



development is the importance of context; that is, the role that the school culture contributes to teacher learning. The narrow focus on the individual has discounted the impact of the organisational culture on teacher learning, practice and their impact on student learning.

Recent studies have demonstrated the influence of school context on teacher effectiveness and student achievement (Boyd *et al.*, 2011; Johnson, Kraft & Papay, 2012; Ladd, 2011). Kraft and Papay (2014) argue that variations in teacher effectiveness are often explained by experience and individual skill sets. Their study, however, found that teacher effectiveness is improved when teachers are 'working in more professionally supportive contexts' (p. 476). Importantly, this study demonstrates how teacher effectiveness increases over time, in particular within a supportive professional context. The authors conclude that 'teachers who work in more supportive environments become more effective at raising student achievement' (p. 477). The role of the leader, therefore, is critical in building a supportive learning culture where teachers can learn and grow in their effectiveness over time and thus are more likely to improve student outcomes.

Within a supportive professional culture, leaders distribute leadership by appointing champions of the profession within the school and complement these with appropriate external experts. This message reinforces Hattie's (2012) notion of building collaborative expertise where internal champions work alongside other teachers to support improvements in classroom practice.

### **Target Beliefs and Attitudes**

There is a growing interest in the importance of teacher attitudes and non-cognitive factors in the context of teacher effectiveness and student outcomes. Specifically, these constructs relate to teachers' motivation, beliefs and attitudes and include self-efficacy, beliefs in relation to students, learning, curriculum, assessment and pedagogy. Darling-Hammond *et al.*, (2012) highlight the important distinction between teacher quality (personal skills, attributes and dispositions) and teaching quality (strong instruction that supports student learning). Non-cognitive factors such as strong interpersonal and communication skills, willingness to learn, resilience, conscientiousness, and organisational and planning skills are well known to be associated with successful teaching (AITSL, 2016). Further, teachers' self-efficacy, their belief that they can promote their students' learning (Hoy, 2000), has been linked to a number of factors related to student achievement, including planning and organisation, resilience and openness to new ideas and methods (see Jerald, 2007 for a review). Although teachers' personal attributes appear in a number of professional development models as an important factor for PD (Guskey, 2002), there has been very little research into how PD actually impacts and interacts with these constructs.

Timperley *et al.* (2007) found that PD programs were able to change the ways in which teachers thought about their students, and the best ways to teach them, noting that programs were often able to



challenge and change teachers' prevailing discourses. These discourses related to how teachers perceived their own teaching practices and their capacity to impact their students' confidence, relationships and outcomes. For example, Alton-Lee *et al.* (2000) case study looked at how PD was able to change the interactions between one teacher and her disabled student, ultimately improving their relationship and the student's engagement. The PD program in this study focused on the different ways disability can be conceptualised, which led to a change in the teacher's attitudes and perception of their student, reflected in a change in the teacher's practices. Similarly, a New Zealand study of teachers working with Maori students found that, with training, teachers' potential damaging perceptions and expectations of their students was able to change (Bishop *et al.*, 2009). Specifically, prior to the PD, teachers focused on their students' disadvantages and barriers to progression, but following the program reflected about how they may be able to adapt their own teaching practices to better meet the needs of their students. Importantly, low expectations of Maori students have been linked to lower performance (Rubie-Davies, Hattie, & Hamilton, 2006), which confirms that students will often perform to match their teachers' low expectations.

Professional development rarely focuses on teacher beliefs and attitudes. While the beliefs of an individual have the potential to impact practice, as we have seen above the beliefs of the collective group of teachers are powerful factors influencing student outcomes. Collective self-efficacy and collective responsibility for student learning are two such examples. Failing to recognise and acknowledge the important role that teacher beliefs play in teacher practice and perseverance, particularly with students who are struggling to learn, runs the risk of low impact professional development. Beliefs which are malleable represent an important area for consideration in developing PD strategies over a sustained period. Changing teachers' ideas about their students is an important step in changing student outcomes.

### ***Acknowledge and Support Cultural Diversity***

Research has repeatedly highlighted the need for teachers to understand their students and how they learn in order to be effective educators (Danielson, 2011; Hattie, 2007), and this includes an awareness of working with a culturally diverse student population. Culturally aware teachers are necessary to support the learning of all students by recognising differences amongst their students and responding appropriately. Importantly, cultural awareness goes beyond merely recognising the existence of cultural differences, requires teachers to reflect upon their own world view, and consider how culture impacts the ways in which they and their students engage in the classroom (Danielson, 2011). Irvine (2003) found that teachers who did not consider culture to be relevant had more negative interactions with their students. In contrast, Hatchfeld *et al.* (2011) found that culturally aware teachers created more positive classroom environments for all their students, regardless of their cultural background. Similarly, children in classrooms of culturally competent teachers are more



inclusive of others and more likely to make friends with different cultural backgrounds. Gay (2010) argued that “cultivating the competence and confidence needed to implement culturally responsive teaching should begin in preservice teacher education programs and continue in in-service professional development” (p. 245) given the evidence that PD programs are able to impact on teachers’ cultural consciousness and competence (Harrington & Hathaway, 1995).

In addition to providing teachers with an understanding of how to work in a culturally diverse classroom, PD should be mindful of the diverse cultures and experiences of participating teachers. This is particularly important in relation to the IB, which involves the participation of teachers from a range of cultural backgrounds. While little research has focused specifically on cultural differences in teacher PD, there is a significant amount of research in other professional contexts (Hoefsted & Minkov, 2010; House, 2004). This research highlights the importance, for example, of adapting communication strategies to suit different cultural contexts. Similarly, Timperley *et al.* (2007) notes the importance of recognising differences amongst teachers to ensure they actively engage with the PD’s content and argues that teachers are likely to ignore practice which they do not see as practical or relevant to them or their cultural experiences. This is no more than an understanding the schools have that teachers will provide learning which is tailored to the individual student and applying this construct to adult learning. Collectively, the research on the importance of culture in educating both students and teachers demonstrates that PD should aim to be culturally inclusive of all participants, and also address cultural diversity within the classroom.

### ***Embeds Principles of Andragogy***

Learning organisations involved in planning and implementing professional learning are increasingly aware of the key principles underpinning effective adult learning (or andragogy). There is a substantial corpus of research which highlights those characteristics of a learning environment which are specific to adults. The following represent some of those key elements.

In the same way that students benefit from explicit learning goals at the commencement of a lesson or unit, so too adults benefit from explicit goals being established both for their learning and their application in the classroom on their return to school. Adult learning is also enhanced when they are engaged in active learning. Teachers learn best when they are engaged in doing – in constructing their own understandings, reflecting on content and when sharing their experiences with colleagues. Teachers learn more effectively when they engage in analysis of teaching strategies or student learning, rather than a didactic approach where they are passive consumers of knowledge. Desimone *et al.* (2002) found that ‘active learning opportunities increase the effect of professional development on teacher’s instruction’ (p. 2).



Problem-based learning is a form of active learning which models an inquiry approach to learning. When teachers are engaged in questioning, experimenting, reflecting – these actions model inquiry-based learning and have been shown to be effective strategies for adults (Supovitz, 2001). Brookfield (2001) argues that adults prefer their learning experiences to be both problem-based as well as having relevance to their daily work; in other words, there needs to be some immediacy of application in the classroom. Brookfield (2001) also notes the importance of the confidence or self-concept of the adult learner and advises that their past experience can influence their openness to learn.

Professional learning that engages the interests of the adult learner and activates their engagement is more likely to be effective. The twin strategies of drawing on their own experience and making the learning relevant to their own work, are more likely to engage the adult. Murphy (2005) highlights the importance by reminding PD planners that adults need to draw on their experience and endeavour to become self-directed learners. He concludes that one of the best ways to do this is to encourage personal responsibility for learning so that the learner identifies need, relevance and application and takes responsibility for what is learned and how it is applied.

Knowles (2005) observed that adult learners have a great volume and quality of experiences, a need to be seen by others as self-directing and independent, and a need to know why to invest effort in learning. Knowles also argues that adult learners' readiness to learn stems directly from specific needs in their social and professional lives, that adult learners are task-centred, and that their strongest motivation to learn comes from intrinsic drivers, such as improving their quality of life, or personal development. Many of these assumptions grew out of developmental psychology and have their own traditions in learning theory, apart from andragogy.

The key principles of effective adult learning have the capacity to inform planning and implementation of professional learning activities. While many dimensions are true of all learners, some are of particular relevance to adults; understanding and accommodating their needs are more likely to result in effective learning.

### Other Trends in Professional Development

*Online and Blended Learning.* Professional development and learning activities are increasingly taking place online, making them more affordable, flexible and accessible (Sorensen & Takle, 2004).

Following a series of case studies, McCloskey and Ketchum (2010) identified three categories of online teacher PD: (1) neo-traditional: where the focus of the PD is deriving knowledge, with workshop leaders the source of knowledge; (2) social constructivist, where participating teachers construct their own understanding of the content; and (3) tele-mentoring, a social learning process whereby learners are apprenticed or mentored. The obvious drawback of the first type of PD is the assumed uniformity amongst participants and the expectation that they will all progress at the same rate and benefit



equally from the content (Sadler-Smith & Smith, 2004). The later options have the flexibility to adapt to teachers' varying needs and experiences by allowing for more self-directed learning (Duncan-Howell, 2009).

One way in which effective professional learning occurs online is participation in professional communities which have been found to benefit teachers as well as their students and schools. Schank (2002) argued that these online spaces are not just a community of learners, but a community who learns. In a review of research examining online learning communities of teachers, Veisco, Ross and Adams (2008) concluded that participation in these networks was often associated with improved teacher practice, as well as gains in student performance. These communities amongst teachers can be formally managed by educational institutions or initiated and administered by the participating teachers. Again, the advantage of these communities taking place online is that they are more accessible and flexible, which means that teachers who may not be able to access traditional learning communities can take part. Similarly, it allows for greater diversity amongst participating teachers with a range in experiences and expertise which provides teachers access to new ideas, practices and resources (Dabner & Davis, 2009).

Another way in which technology can be incorporated into high-quality PD is through blended learning models, which involve both online and face-to-face PD activities. This type of PD typically involves an initial workshop, followed by online activities or networking forums (Arnold & Ryan, 2003; Graham, 2006). Further research found that members of blended professional learning communities, those which involve both online and face to face communication, believe they are gaining more from the interactions and feel more positive about the communities overall (Matzat, 2013). In a review of three different blended PD workshops for teachers, (Owston, Wideman, Murphy, & Lupshenyuk, 2008) found blended learning to be a viable option for teaching teachers. Across the programs, teachers showed moderate effects in changing their practices, with their students showing mild improvements. The authors note that the blended format not only cut program costs and minimised the time that teachers spent outside of the classroom but allowed for ongoing support. Similarly, Garrison and Vaughan (2008) argue that the ongoing technical and pedagogical support for teachers, particularly when they are implementing their new skills, is the key advantage of the blended learning model. Opportunities, too, exist in this model to engage with participants online prior to a PD event, thus enabling a more targeted and needs-based professional learning experience.

*Incentives and accountability.* There is mixed evidence regarding the importance of accountability and incentives in professional development outcomes. In a review of top performing PD programs globally (Jensen, et al., 2016), accountability was identified as a reoccurring feature, with the authors arguing that 'in high-performing systems, evaluation and accountability are integral to the success of professional learning in schools' (p.5). Evaluation and accountability are central to teachers'



professional development in Shanghai, in that teacher appraisal dictates the type of professional development and also because professional development and teacher outcomes are frequently evaluated. For example, teachers must not only participate in mentorship programs to be eligible for promotion, but there must also be evidence of improvement in their mentees. Similarly, schools' professional learning programs are highly scrutinised, with local districts stepping in and taking over programs considered low-quality. Despite the link between PD and evaluation in high performing educational states, more targeted PD research has seen little impact for accountability and incentives. Timperley et al., (2007) found there to be no difference between voluntary and compulsory PD on student outcomes. Instead, teacher engagement in the program, was more important than their initial motivation.

### Critical Features of High-Quality Teacher Professional Development

Based on the review above, Table 4 overleaf identifies nine critical features of high-quality teacher professional development.



Table 4: Critical Features of High-Quality Teacher Professional Development

1. Sustained Length	Longer professional development programs tend to have a greater effect. Meta-analyses show workshops less than <b>14 hours</b> in length typically show no significant effects on student achievement. The most consistent effects on teacher practice are generally found when program participation is over 100 hours (Banilower et al., 2007)
2. Integrate Practice & Feedback	Opportunities for <b>regular practice and ongoing feedback</b> are critical when learning and implementing new skills. Consistent with broader research on deliberate practice, educational research suggests teachers need multiple attempts (e.g., 20 separate practices; Joyce & Showers, 2002) to master a new skill.
3. Job-embedded	To be maximally effective, research recommends that programs be <b>school based</b> and closely related to the daily work of teachers.
4. Ensure Coherence with Curriculum & Content	When professional development programs relate to the <b>current school curriculum</b> and teachers' <b>specific subject areas</b> , they tend to be more effective in changing participants' teaching practices. In this way, high-quality professional development is needs-driven: driven both by the needs of the school and the needs of teachers.
5. Professional Development as a Collective Endeavour	Collaboration is a mediating factor between professional development and teaching practice, with high levels of <b>active teacher collaboration</b> typically strengthening the effectiveness of quality PD. <b>Collective participation</b> —i.e., teachers attending collectively so they can build a shared understanding of the PD content—has previously been referred to as one of five features of effective professional development.
6. Ensure an Engaged & Effective School Leadership	Effective leadership practices include <b>leaders participating in</b> , not just organising professional learning. Robinson (2011) cites this as the leadership behaviour with the greatest effect size in her study of effective leadership. Alongside any professional development process, school leaders should also <b>build the social infrastructure</b> for effective PD by creating an environment where professional learning is valued and where there is a supporting learning culture in which teachers are able to learn and grow in their effectiveness over time.
7. Target Beliefs & Attitudes	Teacher beliefs influence practice. It is therefore important that those who design and deliver professional development acknowledge this influence and endeavour to identify each cohort's underlying beliefs and attitudes—especially those that are malleable—prior to beginning the professional development program.
8. Acknowledge & support cultural diversity	Just as high-quality teaching involves acknowledging students' diverse cultural backgrounds and differentiating teaching accordingly, high-quality PD also involves acknowledging participants' diverse cultural backgrounds and <b>adapting content and delivery to target participants' diverse cultural contexts</b> .
9. Embeds principles of andragogy	The professional development program is <b>consistent with principles of andragogy</b> , such as: incorporating explicit learning goals for learning and practice; active learning; relevance to daily work; encouraging personal responsibility; and building on participants' past experiences.



## Section 4: Pattern Matching

This section of the report focuses on Research Question 3: **Theory-to-Practice: How do IB models compare to professional development best practices?** To that end, it provides an initial assessment of the IB’s professional development model against the nine critical features identified in Section 3.

### Pattern Matching

To assist in this process, the research team borrowed techniques from pattern matching and program evaluation. In social science research, pattern matching involves comparing a theoretical pattern (in this case empirically-based best practice) to an observed pattern (in this case, the IB PD program model [Trochim, 1989]). In conducting this assessment of the IB’s professional development work the research team followed this general process by identifying the above critical features of high-quality teacher professional development, then critiquing the program model against these features. Drawing also from techniques in program evaluation, in particular the logic of evaluation (Scriven, 1995), the research team also developed a rubric to aid in these comparisons. Using this approach, each critical feature was assessed using the rubric set out in Table 5 below.

Table 5: Rubric Used to Assess the IB Professional Development Model

Substantial	Some	Limited	None at this stage
<p>There is substantial evidence this feature is <b>fully reflected</b> in the IB professional development model.</p> <p>A reasonable person, on reviewing the PD model, could easily recognise this feature – in its entirety – as being present in the IB PD model.</p>	<p>There is evidence that <b>some</b> parts of this feature are <b>reflected</b> in the professional development model.</p>	<p>There is evidence that small parts of this feature are <b>minimally reflected</b> in the professional development model.</p>	<p>Either (1) there is <b>no evidence</b> of this feature in the IB professional development model; (2) elements of the model are <b>at odds</b> with / inconsistent with this critical feature; or (3) this feature is outside the scope of the IB’s current professional development model.</p>

Key findings from the pattern matching exercise indicate that the IB PD model is highly aligned to the research literature in some domains—namely, coherence with curriculum and content and consistency with principles of andragogy. However, there are also clear gaps in other domains, including the model’s use of practice and feedback, its inclusion of school leadership in the professional learning process, and its focus on teacher beliefs and attitudes.



These findings are described in more detail in Table 6 below.

Table 6: Key Findings from the Pattern Matching Exercise

Feature	Rating	Findings
1. Sustained Length	Limited	<ul style="list-style-type: none"> <li>• Although the IB’s professional development offerings exceed the identified benchmark (i.e., 14 hours) this is only by a very small margin. While the IB’s professional development model may influence teacher behaviour in the short term, the research literature suggests it is unlikely to have an effect on student achievement.</li> <li>• Even when change to teacher practice is the goal, the IB’s PD opportunities typically require only 15 hours of participation—a duration that is considerably lower than is recommended under best practice.</li> <li>• In contrast to the IB’s offerings, the most consistent effects on teacher practice are generally found when participation is sustained and intensive: at least 49 hours and ideally over 100 hours (Banilower <i>et al.</i>, 2007).</li> <li>• One caveat to this is that workshop leaders are now asked to engage participants prior to, and immediately following, the workshop; however, it is not clear how consistently or systematically this occurs.</li> </ul>
2. Integrate Practice & Feedback	None at this stage	<ul style="list-style-type: none"> <li>• There are few, if any, opportunities for ongoing practice and feedback within the IB’s professional development architecture.</li> <li>• Although <i>within workshop</i> exercises can be—and often are—targeted towards real-world practice and application, these fall short of guidelines described in the educational literature and the broader empirical literature on deliberate practice.</li> <li>• For practice to have sustained effects on skill development and behaviour, this requires <i>repeated</i> and <i>sustained</i> engagement in critical tasks to stretch one’s capabilities beyond current levels, along with by targeted feedback on those efforts. Joyce and Showers (2002), for example, suggest one needs at least 20 separate practice experiences to master a new skill and change behaviour.</li> <li>• Within the IB’s face-to-face programming there are no formalised mechanisms for ongoing support post-workshop; no explicit strategies to aid and encourage educators to engage in post-workshop practice; and no formalised process through which educators can receive feedback on their efforts to put what they learned into practice. While participants may receive feedback on tasks completed during</li> </ul>



Feature	Rating	Findings
3. Job-embedded		<p>professional development workshops, these fall short of the ongoing and repeated nature of feedback that is recommended in the research literature.</p> <ul style="list-style-type: none"> <li>• Although there is greater potential for this to occur in online and blended workshops, it does not appear that these two features, i.e., (1) practice and (2) feedback, have been integrated to any great extent into either online or blended professional development.</li> <li>• A model of feedback is evident in the workshop leader training, which may serve as a starting point for discussion around opportunities to embed practice and feedback into workshops themselves.</li> </ul>
	Limited	<ul style="list-style-type: none"> <li>• Evidence suggests that teachers need to be supported in translating the knowledge and skills gained through PD programs into the classroom environment.</li> <li>• In this way, job-embedded practice involves extending PD learning from seminars and staff rooms into ‘real world’ classroom settings; for example, through use of supports such as: coaches, mentors, in-school classroom-embedded professional development opportunities—essentially, strategies that allow teachers to view PD as a central part of their role and not an additional or separate component.</li> <li>• The majority of the IB’s PD offerings occur outside real-world settings, in two-to-three-day workshops that are functionally disconnected from the day-to-day operations of educators’ classrooms and school environments.</li> <li>• While in-school workshop offerings represent an opportunity to begin forging connections between workshop delivery and ‘real world,’ settings, available documentation suggests this does not occur during the prototypical in-school event.<sup>5</sup></li> </ul>

<sup>5</sup> For example: In-school workshop guidelines for the AP indicate that ‘a typical workshop schedule is 8 x 1.5 hours sessions (2 days or 12 x 1.5 sessions (3 days) with 3 breaks, Morning (0.5 hours), Lunch (1 hour), Afternoon (0.5 hours). Day starts at 8.30 a and concludes at 16.30. In negotiation with workshops leaders, school may adjust start and finish times by up to 1 hour. If schools need to amend this structure beyond this, the Regional Office should be contacted.’ (see: <http://www.ibo.org/globalassets/events/ap/in-school-workshops-terms-and-conditions-ap-en.pdf>) This is consistent with guidelines for the AEM, which also specify that these are to be student-free days.



Feature	Rating	Findings
<p>4. Ensure Coherence with Curriculum &amp; Content</p>		<ul style="list-style-type: none"> <li>• Blended in-school workshops and ‘workshops over time’ may also represent an opportunity to maximise the connection between professional development implementation and real-world settings but the research team has not seen evidence to suggest how frequently this may occur.</li> <li>• In-school workshops have the potential to build teacher collaboration and therefore opportunities for them to establish and maintain feedback structure around job-embedded professional development.</li> </ul>
	Substantial	<ul style="list-style-type: none"> <li>• When professional development programs relate to the current school curriculum and teachers’ specific areas, they tend to be more effective in changing participants’ teaching practices.</li> <li>• This domain reflects a great strength in the IB’s professional development offering. Given the workshop content and design process, which closely align workshop content to the standards and practices and each programme’s curriculum requirements, there is strong evidence for alignment between professional development content and participants’ curriculum.</li> <li>• There is evidence of this feature in IB’s the subject-specific seminars and professional development offerings, as well as its three-tier PD system represents. These two features of the IB’s professional development offering ensure opportunities for PD participants to align their PD experience with both stage of IB career and subject expertise.</li> </ul>
<p>5. Professional Development as a Collective Endeavour</p>	Some	<ul style="list-style-type: none"> <li>• Within the research literature on professional development in education, collective participation—i.e., educators attending workshops together so they can build a shared understanding of improvement strategies and effective teaching approaches—has been referred to as one of the five features of effective professional development. Such collective participation enables teachers to form a common understanding about strategies for effective practice and improving learner outcomes, while also forming the foundations for <i>active</i> collaboration.</li> <li>• Although there are no mandated requirements for collective participation in the IB’s professional development workshops—at least in the sense that educators from the same school need not attend workshops together—there is nevertheless <i>some</i> evidence that this critical feature does occur in practice. For example:</li> </ul>



Feature	Rating	Findings
		<ul style="list-style-type: none"> <li>○ First, in-school workshop offerings provide a valuable opportunity to ensure collective participation so that school teams can attend professional workshops together</li> <li>○ Second, educators can, and often do, attend professional workshops with others from their school. Thus, while there are no requirements for collective participation in IB PD, it can and does occur</li> <li>○ Additionally, there is an expectation (although no formal requirement) that educators will share what they have learned during a professional development workshop with others at their school. While this is a practice that has the potential to help build shared understanding it is unclear whether this occurs, with any degree of consistency, in practice.</li> <li>● With that said, the nature of the IB’s PD—through its peer-to-peer delivery model and the fact that workshops bring together teachers from around the globe—has potential to support the development of a broader professional learning community of IB educators. That is, while the IB’s professional development structure does not necessarily support collaboration <i>within</i> schools, PD workshops do provide opportunities for active collaboration <i>across</i> schools through collaborative workshop activities and peer-to-peer sharing and discussion. In this way, there is potential for <i>cross-school</i> teacher networks to emerge from attendance at professional development workshops.</li> </ul>
<p>6. Ensure an Engaged &amp; Effective School Leadership</p>	<p>None at this stage</p>	<ul style="list-style-type: none"> <li>● Robinson (2011) cites leaders participating in professional learning as the leadership behaviour with one of the greatest effect sizes on learner outcomes.</li> <li>● As with collective participation, there are no mandated requirements for leaders to participate in the IB’s professional development workshops with other educators from their schools. While this may informally occur from time to time, it is neither explicitly encouraged nor required by the IB.</li> <li>● There is also no expectation or requirement for leaders to demonstrate ways in which educators’ attendance at IB PD workshops is connected to internal processes for professional learning within the school.</li> </ul>



Feature	Rating	Findings
7. Target Beliefs & Attitudes		<ul style="list-style-type: none"> <li>Such a disconnect between school leadership and educators' IB-specific professional learning may serve to limit opportunities for developing a supportive learning culture in which teachers are able to learn and grow over time.</li> </ul>
	None at this stage	<ul style="list-style-type: none"> <li>Teacher beliefs influence practice. When professional learning begins by identifying a particular cohort's beliefs and attitudes relating to the PD content, workshop leaders can begin to target those beliefs that are malleable and might influence teacher practice.</li> <li>While the IB's pre-workshop survey reflects an ideal space in which this could occur, there is no requirement that workshop leaders collect data on teacher beliefs and attitudes prior to beginning the workshop.</li> <li>Based on the research team's understanding of the IB's professional development architecture, there are also no other avenues through which this information might be collected about PD participants.</li> <li>It is also not clear that the pre-survey explores attitudes and beliefs. Our understanding is that the focus of the pre-workshop survey focuses on content and experience rather than deepening an understanding of teacher beliefs/attitudes that may lead to improvements in teacher practice.</li> </ul>
	Some	<ul style="list-style-type: none"> <li>Those engaged in teaching adults are most effective when they understand and accommodate the needs of the individual learner. There are many variables which suggest areas in which participants may express difference and influence learning. Across the IB community, one of the key differentiators is that of culture or background. Given the research into the factors impacting on learning, in particular those relating to culture, there is an expectation that cultural considerations will be present in both planning and delivery of the IB's PD.</li> <li>There is limited evidence that this level of awareness is present in either the WSL training or in the workshop planners and session guidelines, leaving this element to the individual to implement.</li> </ul>
8. Acknowledge & support cultural diversity		
9. Embeds principles of andragogy	Substantial evidence	<ul style="list-style-type: none"> <li>This domain reflects another strength of the IB's professional development offering. All workshop materials reviewed in the preparation of this report incorporated include explicit learning goals;</li> </ul>



Feature	Rating	Findings
		<p>all workshops attended also regularly referred to explicit learning goals, both for individual sessions and the workshops themselves.</p> <ul style="list-style-type: none"><li>• In general, IB PD learning experiences are active in nature, directly relevant to participants' work and build on participants' past experiences. Workshop leaders are encouraged to distribute pre-surveys that enable them to understand and target learners' specific interests and needs relating to workshop content. These same interests and needs can also be captured during the workshops themselves through targeting exercises (designed to understand participants' past experiences) and the systems for ongoing communication and feedback, which enable participants to communicate directly with workshop leaders about their past experiences and immediate learning needs.</li><li>• There is also significant evidence that participants are engaged in active learning, where they draw on current experience, and are encouraged to use the new learnings in their classrooms when they return to school.</li><li>• Evidence of inquiry-based approaches to learning are also modelled in many workshops, supporting the active, inquiry aspects of adult learning.</li></ul>



## Section 5: Impact on teachers' knowledge, attitudes, beliefs and self-efficacy

This section of the report describes findings from the third phase of this study, Outcome Study 1 – a pre-post study exploring changes in teachers' knowledge, attitudes, beliefs and self-efficacy as a result of taking part in IB face-to-face workshops. In doing so, it summarises findings from two of the broader study's research questions:

- **Research Question 4: Knowledge, attitudes, beliefs:** What is the difference in teacher knowledge, attitudes and beliefs before and after participation in IB face-to-face workshops?
- **Research Question 5: Self-efficacy:** (a) What is the difference in teachers' levels of self-efficacy before and after participation in face-to-face workshops? (b) What is the difference in schools' collective self-efficacy before and after their teachers participate in face-to-face IB workshops?

### Design & Methods

#### Overview

As part of Phase 3, CPE conducted two online surveys with teachers who attended face-to-face workshops between September 2017 and March 2018. For the purposes of this study, three English language face-to-face workshops were selected on the basis of being frequently held and including all three categories and all three focus programmes:

- Making the PYP Happen in the Classroom (PYP, Category 1)
- DP History (DP, Category 2)
- Approaches to Learning in the MYP (MYP, Category 3)

Under this approach, CPE invited all teachers who were registered to attend these workshops to complete one survey before attending the workshop and one survey after the workshop. Pre-surveys asked questions about teachers' (1) knowledge about workshop content, (2) attitudes towards the IB and key workshop goals, (3) beliefs about what would happen if those workshop goals were achieved and (4) their level of self-efficacy. Post-surveys asked the same questions, along with additional items about the workshop experience and any post-workshop follow-up.

These surveys were followed by a small number of purposively sampled interviews ( $n = 7$ ) with teachers who demonstrated (1) high, (2) moderate, and (3) limited change in knowledge, attitudes, beliefs, and self-efficacy through their involvement in the face-to-face workshops.

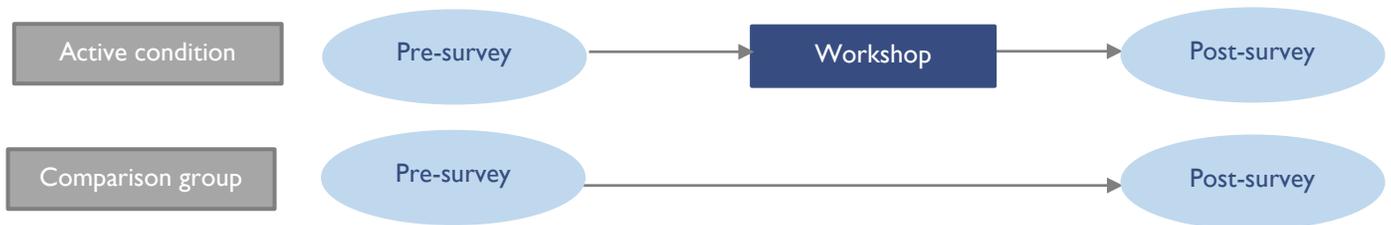


CPE also invited teachers who **did not** attend workshops to complete the same surveys to create a comparison group and to identify which changes (if any) may be related to participants' involvement in the PD workshops (see Figure 7).

**Summary.** Teachers completed the same survey before and after attending workshops. Teachers from a comparison group (i.e., those who did not attend workshops) also filled out the surveys so we could understand how those who attended workshops changed in relation to those who did not.

This approach is called a non-equivalent comparison group design.

Figure 7: Overview of Study Design



### Sampling

**Workshop sampling.** At the outset of this study, the research team recognised that survey questions would need to vary based on the specific workshops that participants attended. Knowledge gained during a DP History workshop, for example, will differ quite considerably to that gained through a PYP concept-based learning workshop—with survey questions needing to vary accordingly. For this reason, we determined that separate surveys needed to be created for each different workshop.

In collaboration with the Research Advisory Committee, CPE decided to focus this study on three **frequently held** workshops. This approach allowed CPE to minimise the number of survey versions required (thereby minimising potential for incomparability across surveys), whilst also maintaining the required sample size.

Using data from the online IB 'Find workshops' website<sup>6</sup> CPE identified a list of the 24 most frequently held workshops between May and June 2017. Using this list, and with a view to ensuring that all three categories and all three focus programmes (PYP, MYP, DP) were represented, CPE selected three workshops as the focus for this study:

- Making the PYP Happen in the Classroom (PYP, Category 1)
- DP History (DP, Category 2)
- Approaches to Learning in the MYP (MYP, Category 3)

<sup>6</sup> <http://www.ibo.org/professional-development/find-events-and-workshops/>



*Participant sampling.* All participants registered to attend the chosen workshops from 1 September to 15 November 2017 were invited to take part in the pre-survey. Those who completed the pre-survey were also invited to complete the post-survey.

Due to initially limited response rates, the survey period was extended. All participants registered to attend the chosen workshops between 1 January and 28 February 2018 were also invited to take part.<sup>7</sup>

In total, 947 workshop participants were invited to take part. Invitations were sent to PYP ( $n = 762$ ), MYP ( $n = 59$ ), and DP ( $n = 126$ ) workshop participants, with 108 completing both the pre and post surveys (11.4%).

*Comparison group.* To obtain a comparison group, invitations were sent to a random selection of PYP ( $n = 757$ ), MYP ( $n = 665$ ) and DP ( $n = 1476$ ) Coordinators, asking them to invite any PYP, MYP or DP History teachers who had not participated in the chosen workshops, and would not take these workshops in the next six months, to complete the two surveys. This process resulted in 275 individuals completing the pre-survey, and 63 individuals completing both the pre- and post-surveys.<sup>8</sup>

### **Survey design**

Surveys were designed to capture five key constructs:

1. Knowledge (open ended items, multiple choice items)
2. Attitudes (Likert scale items)
3. Beliefs (Likert scale items)
4. Self-efficacy (Likert scale items), and
5. Collective self-efficacy (Likert scale items).

Although question content items differed across the three workshops, each survey followed the same structure to maximise potential for comparability across workshops.

Wherever possible, the research team identified existing, validated scales (e.g., the Norwegian Teacher Efficacy Scale) or drew upon relevant literature to develop study-specific items. See Appendix 2 for an overview of the sources used to develop study surveys. Final instruments are attached in Appendix 3.

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<sup>7</sup> Note that response rates to the pre-survey sat at 37%; it was obtaining responses to the post-test that was challenging for the research team.

<sup>8</sup> Given that we do not know how many teachers (a) received the survey request from their coordinators, and (b) met the criteria (i.e., that they had not completed the relevant workshop and would not do so in the next six months) it is not possible to calculate a response rate for the comparison group surveys.



When developing workshop-specific items, the research team first reviewed written materials about the selected workshops, then interviewed representatives from the IB to gain a stronger understanding of the specific knowledge, attitudes and beliefs that were expected to change as a result of the workshop. Representatives from the Research Advisory Committee also reviewed the surveys prior to their distribution among workshop participants to ensure these were consistent with IB intentions for the relevant workshops.

*Situational judgment items.* In addition to open ended and multiple-choice knowledge items, the research team embedded situational judgment tests into the online surveys. In situational judgment tests (SJTs), individuals are presented with a situation and asked what they would do in response (McDaniel *et al.*, 2001). Responses are captured through multiple choice items that identify a list of possible options but can be combined with open-ended responses where participants justify their choices. Situational judgment tests have been shown to predict a range of professional outcomes including technical proficiency, supervisory performance ratings (Stemler & Sternberg, 2006), and job performance (McDaniel *et al.*, 2001). Within the context of education, SJTs have been used to assess the readiness of teacher candidates for work in the teaching profession (Bowles, Hattie, Dinham, Scull & Hattie, 2014) and are an emerging tool for the measurement of non-cognitive factors that affect teacher performance in the classroom.

### **Analysis**

Throughout this study the CPE team ran a series of quantitative analyses to address the research questions. Although specific analyses varied by the question being addressed, in general these included:

1. A series of related samples *t*-tests to examine change in core domains (knowledge, attitudes, individual self-efficacy, collective self-efficacy, beliefs, etc.) across the pre- and post-surveys. Where distributions did not meet parametric assumptions, non-parametric tests (i.e., a Wilcoxon *T* test) were run as a sensitivity check, with results from the more conservative non-parametric tests reported when findings did not concur.
2. A series of repeated measures Analysis of Variance (ANOVAs) to compare changes in core domains among those who took part in workshops and those who did not take part in workshops. In these analyses, time (pre/post) was entered as a within-subjects factor and participation (active/comparison group) was entered as a between-subjects factor to test for an interaction between those who did and did not take part in the workshops.
3. A series of multiple regression analyses were also conducted to examine the relationship between various context and mechanism factors and overall PD outcomes. In these analyses, relevant variables from the pre-survey were entered on the first step (i.e., a composite variable comprising scores on the attitude, beliefs and self-efficacy items from the pre-



survey) to account for participants' prior knowledge, beliefs or attitudes; and relevant content or mechanism variables entered on the remaining steps. For these analyses, a composite variable comprising scores on attitude, beliefs and self-efficacy items from the post-survey was used as the outcome variable.

4. Finally, a series of exploratory factor analyses were also conducted as an initial check on the construct validity of the constructs being measured.

Additional detail on specific analyses is provided in the body of this report and, where relevant, in Appendices 4 and 5.

## Participants

Overall, 171 educators, combining 108 workshop participants and 63 non-participants, completed both pre- and post-surveys as part of this study. The majority of participants were teachers (82%) currently teaching in the programme connected to their workshop (i.e., PYP, MYP or DP; 83%). Most (92%) had either a Bachelor's or a Master's degree, and held, on average, 6.18 ( $SD = 6.7$ ) years' experience at an IB World School, 4.29 years' ( $SD = 4.28$ ) experience at their current school, and 3.93 years' experience in the programme connected to their workshop. The majority of participants also represented the PYP workshop (Making the PYP happen in the classroom;  $n = 95$ , 56%), followed by the MYP workshop (Approaches to teaching and learning in the MYP;  $n = 42$ , 24%) and the DP workshop (DP History Category 2,  $n = 34$ , 20%). Participants attended English Language workshops in 28 countries, representing all three IB geographic regions.

## Results

### **Research question 4: Attitudes, beliefs and knowledge**

#### **Attitudes**

**Summary.** After attending PD workshops participants reported (1) significantly more positive attitudes towards the IB's approaches to teaching and learning, (2) somewhat more positive **general** attitudes towards workshop content and strategies, and (3) significantly more positive **specific** attitudes towards workshop content and strategies. However, for all measures of attitudes, effect sizes were small and changes in **general** attitudes may not be the result of workshop participation.

During Phase 2, CPE examined changes in three types of educator attitudes: (1) attitudes towards IB's approaches to teaching and learning (ATL), (2) general attitudes towards the workshop content and strategies,<sup>9</sup> and (3) specific attitudes towards workshop content and strategies.

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<sup>9</sup> General attitudes refer to broad, high-level attitudes towards a construct that are not connected to the individual; for example, the view that 'using inquiry-based learning strategies is good'. Specific attitudes, on the other hand,



*General attitudes* and *attitudes towards IB approaches to teaching and learning* were included in this study to provide a high-level understanding of participant views, whereas *specific attitudes* were measured because of extensive research suggesting specific attitudes are a stronger predictor of behaviour than general attitudes. These three levels were measured in the following ways:

Construct	Items	Cronbach's alpha
Attitudes towards IB approaches to teaching and learning	6 items, each on 7-point scales <sup>10</sup> where higher values reflect more positive attitudes.	Pre, $\alpha = .944$ ; post, $\alpha = .935$
General attitudes towards workshop content and strategies	4 items, <sup>11</sup> each on 7-point scales where higher values reflect more positive attitudes.	Pre, $\alpha = .762$ ; post, $\alpha = .760$
Specific attitudes towards workshop content and strategies	7 items, <sup>12</sup> each on 7-point scales where higher values reflect more positive attitudes.	Pre, $\alpha = .879$ ; post, $\alpha = .789$

For the purposes of this study, attitude items were combined into three high level variables (Attitudes towards IB ATL, General attitudes, Specific attitudes) that were later used in the analysis. An Exploratory Factor Analysis (EFA) indicated support for this three-factor attitude structure, with these three factors accounting for more than 75% of the variance across these items (for additional detail, see Tables 3 and 4 in Appendix 4).

Related samples *t*-tests and non-parametric Wilcoxon T-tests were used to explore changes in attitudes across the pre- and post-surveys for those who did and did not attend workshops. Using

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are connected to the individual, and relate to the individual performing particular behaviours in specific contexts; for example, it is a good idea for **me** to use inquiry-based learning in **my** Year 6 classroom.

<sup>10</sup> For example, *The IB's approaches to teaching and learning are*: Bad → Good; Worthless → Valuable, Ineffective → Effective, Worst instructional practice → Best instructional practice, Incoherent → Coherent, Dated → Future oriented

<sup>11</sup> As an example, *According to IB materials, the goals of this workshop are to [insert workshop-specific goals]. If you were to attend the workshop, what would your expectations be? I expect the workshop would be...* Bad → Good, Worthless → Valuable, Hard → Easy, Irrelevant → relevant, Poorly timed → Timely,

<sup>12</sup> For example, *How unimportant or important are the following goals for **you** in **your classroom** at **your school**? [insert workshop-specific goals].*



this approach, results suggest that after attending IB PD workshops participants in this sample reported:

- Significantly more positive attitudes towards the IB's approaches to teaching and learning (see Figure 8),<sup>13</sup> and
- Significantly more positive general attitudes towards workshop content and strategies (see Figure 9).<sup>14</sup>

For additional detail see Tables 10-14 in Appendix 4.

**What does it mean when something is 'significant?'** In many quantitatively oriented research studies, statistical tests are run to rule out 'chance' or 'random error' as a reason for the results we see. When something is 'significant' it means that the obtained result is so unlikely (traditionally in the social sciences, this means there is less than a 1 in 20 chance of it occurring) that we can be confident this difference is not just the product of chance, but rather due to some other influence.

Those in the comparison group who *did not* attend workshops also reported more positive **general** attitudes, however, this was not statistically significant. It is possible that the change in this domain could be the product of participant maturation (e.g., changes in views over time as teachers gain more experience with specific material), or to something other than the professional development workshops.

Participants from the comparison group did not report significant change on either attitudes towards the IB, or specific attitudes. However, a repeated measures Analysis of Variance suggested there was a significant interaction between time and participation for specific attitudes such that those who attended workshops demonstrated more positive attitudes on the post-survey, whereas those who did not attend workshops reported less positive attitudes on the post-survey (see Figure 10 below and Tables 10-14 in Appendix 5). Additional research would be required to determine why those who did not attend the workshop held less positive specific attitudes at the time of the post-survey.

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<sup>13</sup>  $t(94) = 2.173, p = .032.$

<sup>14</sup>  $t(92) = 2.192, p = .031.$

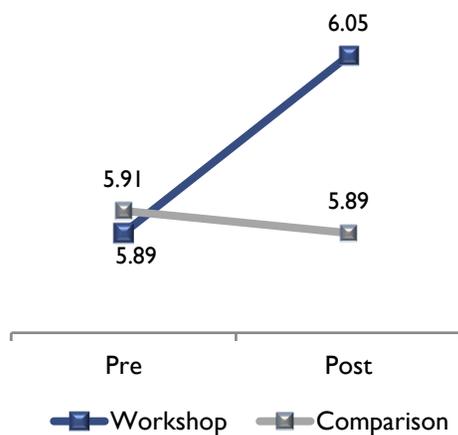


All effect sizes for the workshop group were small (see Table 7).

Table 7: Effect Sizes Related to Attitudinal Change

Construct	Effect size – workshop participants	Effect size – comparison group
Attitudes towards IB ATL	0.18	-0.02
General attitudes	0.12	0.15
Specific attitudes	0.16	-0.24

Figure 8: Change in Attitudes towards IB Teaching and Learning, Pre and Post (n = 155)



**What does it mean if the “average” score is 5.89?** Many of the scales used in this survey were reported on a 7-point scale with higher values reflecting “more” of the domain being measured. An average score above 4 therefore means most people fall on the positive end of this spectrum. An average score below 4 means most fall on the negative end of this spectrum. An average score of 5.89 therefore means that most people responding to this survey held positive views about the IB’s approaches to teaching and learning regardless of whether they attended the workshops or not.

Figure 9: Change in General Attitudes, Pre and Post (n = 154)

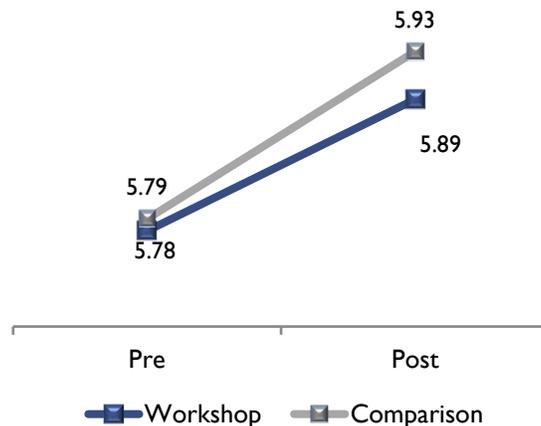
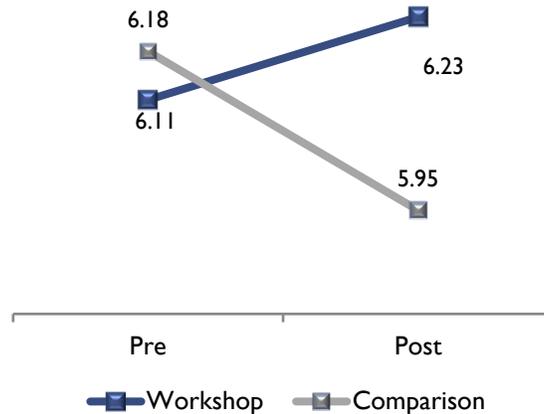


Figure 10: Change in Specific Attitudes, Pre and Post (n=156)



**Interaction.** A technical term that means the relationship between two variables (for example: the relationship between height and weight) depends on or differs based on another variable (for example: gender). Here, the effect of time (i.e. the difference between pre-survey and post-survey) on attitudes differs based on whether an individual participated in the workshops or not.

*Interviews:* Consistent with survey findings, three teachers described positive changes in attitudes after taking part in IB workshops. Changes were described by teachers who attended both MYP and PYP workshops, and among those who attained both high and low levels of change from the pre- to post-survey, with teachers emphasising changes in general attitudes related to IB approaches to teaching and learning. For example:

- *"I just loved the whole approach to learning, inquiry-based stuff... This gave me a real passion and an excitement for the curriculum, and curriculum usually doesn't get me excited."* PYP teacher, High change
- *"It gave me an open mind to accept all different ideas and then try to apply it in the classroom as well, and bringing it out to the children."* PYP teacher, Low change
- *"Prior to the course ... I didn't fully grasp really the importance of the skills, or have the confidence to know, "This is what's really important about the IB."* MYP teacher, High change



## Beliefs

**Summary.** Participant beliefs about workshop content and strategies were separated into two dimensions: positive outcome expectancy beliefs (i.e., beliefs about positive outcomes that would follow from putting workshop content and strategies into practice) and negative outcome expectancy beliefs (i.e., beliefs about negative outcomes that would follow from putting workshop content and strategies into practice).

Participants' positive outcome expectancy beliefs were not significantly higher after attending PD workshops. However, participants did report stronger *negative* outcome expectancy beliefs after attending workshops—specifically the view that putting workshop content and strategies into practice would require working longer hours and would mean they fall behind on other commitments.

When measuring beliefs for this study, the research team focused on a category of beliefs known as 'outcome expectancy beliefs'. This refers to people's expectations (e.g., positive, negative, social) about what will happen if they put a particular behaviour into practice.

For the purposes of this study, CPE included seven survey items targeting participants' outcome expectancy beliefs. These focused on what might happen if the participants put workshop skills and strategies into practice. These included items such as *If I put the workshop objectives into practice...student learning would improve*; *If I put the workshops into practice I would be a more effective teacher*; or *If I put the workshop objectives into practice I would fall behind on my other commitments*.

An initial exploratory factor analysis suggested these 7 items reflected two overall constructs: (1) positive beliefs about putting workshop behaviours into practice (5 items, e.g. *If I put the workshop objectives into practice student learning would improve*)<sup>15</sup> and (2) negative beliefs about putting the workshop behaviours into practice (2-items, e.g. *If I put the workshop objectives into practice I would have to work longer hours*).<sup>16</sup> For this reason, these seven items were converted into two

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<sup>15</sup> Presented as: Think about what would happen if you achieved the workshop goals. For example, if you attended the workshop, learned what the workshop leaders intended you to learn, gained the skills they hope you to gain, and changed in the ways you hoped. [insert workshop specific goals]. How much do you disagree or agree with the following? *If I put the workshop objectives into practice, I expect that...Student learning would improve, My teaching would better align with the IB teaching philosophy, My school would have a more collaborative teaching environment, My supervisor/s (e.g., head of department) would acknowledge my effort, I would be a more effective teacher.*

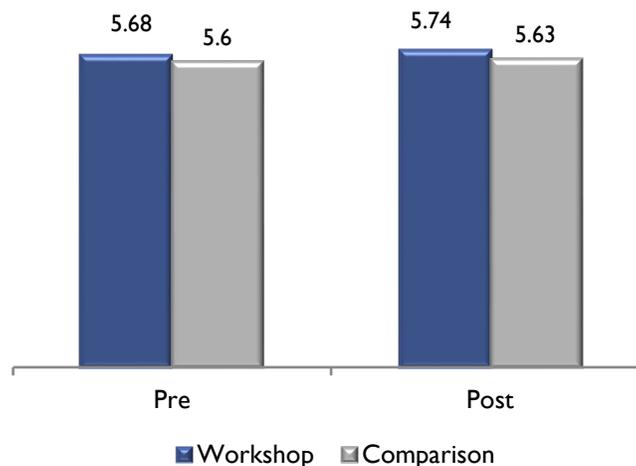
<sup>16</sup> Items (preliminaries as above): <sup>16</sup> I would fall behind on my other commitments, I would have to work longer hours.

overall composite variables measuring: (1) positive outcome expectancy beliefs,<sup>17</sup> reported on a 7-point scale and where higher values reflect more positive beliefs; and (2) negative outcome expectancy beliefs,<sup>18</sup> reported on a 7-point scale and where higher values reflect more *negative* beliefs about putting workshop behaviours into practice. Additional detail on this exploratory factor analysis is provided in Tables 5 and 6 of Appendix 4.

Related samples *t*-tests were run to compare changes in participant views about negative outcome expectancy beliefs, whereas non-parametric Wilcoxon T-tests were used to explore changes in positive outcome expectancy beliefs. Non-parametric tests were run in the latter case because the initial distributions did not meet parametric requirements.

Using this approach, participants reported similar positive outcome expectancy beliefs both before ( $m = 5.68$ ;  $SD = 1.20$ ) and after ( $m = 5.74$ ;  $SD = 0.95$ ) attending workshops.<sup>19</sup> Similarly, comparison group participants also did not report changes in positive beliefs between the pre- ( $m = 5.60$ ;  $SD = 1.13$ ) and the post-survey ( $m = 5.63$ ;  $SD = 1.23$ ) to the pre-survey (see Figure 11).

Figure 11: Change in Positive Outcome Expectancy Beliefs, Pre and Post ( $n = 156$ )



In contrast to this, workshop participants reported significantly higher *negative* outcome expectancy beliefs after attending workshops ( $m = 4.12$ ,  $SD = 1.61$ ) when compared to before the PD workshops ( $m = 3.61$ ,  $SD = 1.79$ )<sup>20</sup> but these same differences were not observed among those

<sup>17</sup> Pre  $\alpha = .883$ ; post  $\alpha = .890$ .

<sup>18</sup> Pre  $\alpha = .872$ ; post  $\alpha = .820$ .

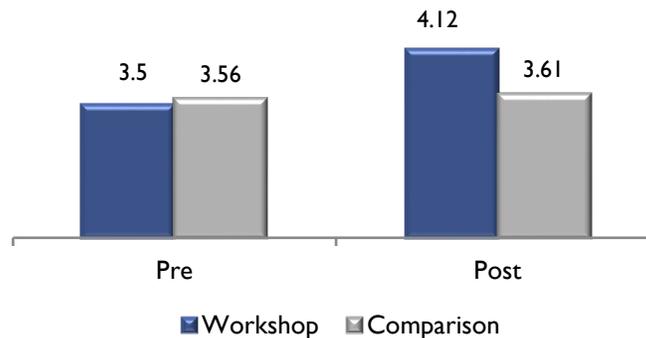
<sup>19</sup>  $Z = -.017$ ,  $p = .986$ . Test run using non-parametric statistics (Wilcoxon T) because the initial distribution did not meet the assumptions for a related samples *t*-test.

<sup>20</sup>  $t(96) = 3.30$ ,  $p = .001$ .

in the comparison group (pre  $m = 3.56$ ,  $SD = 1.65$ ; post  $m = 3.61$ ,  $SD = 1.79$ ).<sup>21</sup> A repeated measures Analysis of Variance supports this view, indicating a significant interaction between time and participation for negative beliefs such that those who attended workshops demonstrated a greater degree of change in negative attitudes than those who did not attend the workshop (see Figure 12 below and Tables 15-17 in Appendix 5).

While these findings may not be intuitive, they may simply reflect a growth in participants' understanding of the work (e.g., time, resources) required to put workshop content and strategies into practice. In this way, participants may learn during an IB workshop what is required to do X well (for example, a workshop strategy such as explicitly embedding ATL skills into unit plans). This finding reflects the need for workshop designers and leaders to consider teachers' broader school environments, ensuring workshops offer practical strategies and support for fitting workshop content and strategies into teachers' everyday work lives. This also reinforces the importance of the role of the school in providing PD participants with support and opportunities to practise on their return to school and having a trusted colleague to provide feedback.

Figure 12: Change in Negative Outcome Expectancy Beliefs, Pre and Post ( $n = 156$ )



*Interviews:* Somewhat in contrast to survey data, three of the teachers interviewed explicitly referred to changes in beliefs after attending PD workshops. Although survey data suggested similar levels of positive outcome expectancy beliefs before and after the workshop, these interviewees described positive changes in outcome expectancy beliefs, with a focus on their now-different views about the potential impact of specific teaching practices and strategies on student learning. For example:

<sup>21</sup>  $t(58) = .238$ ,  $p = .813$ .



- *“Before going to the workshop, it's like, “Okay, I've read through the skills”. The school had talked about the different skills, so I knew they were important, but I feel like after going to a workshop, it's like, “Okay, these learning skills, that's what we need to be all about...My classroom content needs to be a vehicle to teach the kids these skills. These skills are what will transfer into university or into a job or into other areas of their lives. If they can walk out of my classroom having learned something that's beneficial for their whole life, I've done something.”* MYP Teacher, High change
- *“I am still considering – I haven't done it yet – but I still want to propose that we change some of the [curriculum content] options that we choose because I think it might benefit the students more. It was interesting that the workshop leader mentioned that there was a lot of focus on war and death and destruction and authoritarian leaders, and suggesting people move towards a more positive approach to history and look at the light movements as a more positive role model for the students.”* DP teacher, High change

Interestingly, these changes were largely described amongst interviewees who demonstrated high levels of quantitative change (comparing the pre-to-post surveys), suggesting that changes in this domain may have occurred among some, but not all participating teachers.

### **Knowledge**

**Summary.** Participants who attended PD workshops achieved slightly higher scores on post-survey knowledge items, although these differences represent a small effect size (0.15) and were not statistically significant. In contrast, those who *did not* attend the workshop attained significantly *lower* scores on post-survey knowledge items. It is possible that this result, particularly for those in the comparison group, may be due to the open-ended (and therefore time intensive) nature of knowledge items.

Participant knowledge about workshop content was measured in two key ways as part of this study. First, participants were asked a series of multiple-choice and open-ended items to capture knowledge and understanding about workshop content. These items were created in collaboration with IB representatives and workshop leaders to ensure their relevance and accuracy. Open-ended items were quantitatively coded against a rubric created by CPE and reviewed by representatives from the IB to ensure its accuracy.

Additionally, participant *knowledge in context* was assessed through a series of situational judgment items that asked participants to read a given scenario, select a ‘best option’ and a ‘least best option’ from a range of possible responses, then describe why those responses reflected the most and least appropriate responses. Responses were quantitatively coded against a rubric that was created by CPE and reviewed by representatives from the IB to ensure its consistency with the workshop content.

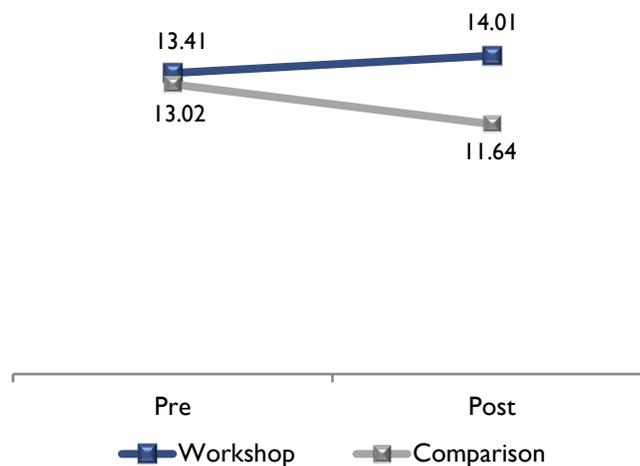


When combined, these two approaches create a knowledge scale that ranges from 0 to a total of 24 possible points.<sup>22</sup>

Using a related samples *t*-test, results suggest that PD participants scored slightly higher ( $m = 14$ ;  $SD = 3.96$ ) on the post-survey than they did on the pre-survey ( $m = 13.4$ ;  $SD = 4.15$ ), although these differences reflect a small effect size (0.15) and were not statistically significant.<sup>23</sup> In contrast, those who did not attend the workshop scored significantly lower on the post-survey ( $m = 11.64$ ;  $SD = 4.05$ ) than they did on the pre-survey ( $m = 13.02$ ;  $SD = 4.03$ ; see Figure 13).

It is important to note, however, that there were considerable missing data on open-ended knowledge items<sup>24</sup>, and it was difficult for the research team to determine whether questions were missed because the participant (a) did not know how to respond, or (b) because they simply chose not to respond, either because of survey fatigue or for some other reason. The research team chose to run the above analyses on those who responded to at least half of the knowledge items, which left a sample size of 121 participants for this particular analysis.

Figure 13: Change in Knowledge, Pre and Post ( $n = 121$ )



<sup>22</sup> Given that the knowledge scale was computed by summing items rather than creating a composite scale, no factor analysis was conducted on this set of items. Instead, this set of items was summed and treated as a single scale.

<sup>23</sup>  $t(67) = 1.462, p = .148$ .

<sup>24</sup> 46% of open-ended knowledge items across workshop and comparison groups had missing data.



## Research question 5: Self-efficacy and collective self-efficacy

### Self-efficacy

**Summary.** After attending PD workshops, participants were significantly more confident in their ability to implement workshop content and strategies. Promisingly, the effect size for differences in self-efficacy was large (1.08), and these differences were not observed among those who did not attend the workshops.

To measure participant self-efficacy, the research team developed 11-items<sup>25</sup> targeting participants' beliefs about their ability to put workshop content and skills into practice. Consistent with established guidelines (e.g. Bandura, 1986), these items focused not only on exploring participants' beliefs about their knowledge and capacity with respect to workshop content and strategies, but also participants' beliefs about their ability to put the content/strategies into practice *within the constraints* of their current operating environment. This contextual element was included to account for the practicalities of the participants' current contexts, with the view that many people feel they can perform particular tasks/behaviours in ideal circumstances—the challenge becomes implementing them within the constraints of one's everyday work environment. An exploratory factor analysis of these 12 self-efficacy items suggested the questions captured two distinct dimensions: one that focused on participants' general self-efficacy (do I feel I know, understand and can implement these strategies in general?)<sup>26</sup>, and another focused on participants' contextual self-efficacy (do I feel I can apply these strategies in the specific context of my school and classroom?).<sup>27</sup> These two factors explained nearly 70% of all variance across the items (see Tables 7 and 8 in Appendix 4 for more detail).

As in other domains, these items were combined into two 'self-efficacy' scales: one focused on general self-efficacy,<sup>28</sup> and another focused on self-efficacy in context.<sup>29</sup> Related samples t-tests were run to compare changes across the pre- and post-surveys, with the non-parametric Wilcoxon

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<sup>25</sup> Included two sets of items. Set 1 (6-items) asked participants: How much do you disagree with the following statements: I understand/know how to...[insert workshop-specific goals or strategies]. Set 2 asked participants to respond to the statement *I am confident I can implement [workshop specific goals] in my current school environment, while also meeting my other teaching commitments, with the resources I currently have available, even in mixed ability classes, without extra support from colleagues at my school.*

<sup>26</sup> 8 items, including, for example, *I know how to assess students using the PYP framework; I know how to plan using the PYP framework.*

<sup>27</sup> 4 items, including, for example, *I can implement the PYP in my current school environment; I can implement the PYP with the resources I currently have available.*

<sup>28</sup> Pre  $\alpha = .908$ ; post  $\alpha = .903$ .

<sup>29</sup> Pre  $\alpha = .912$ ; post  $\alpha = .888$ .



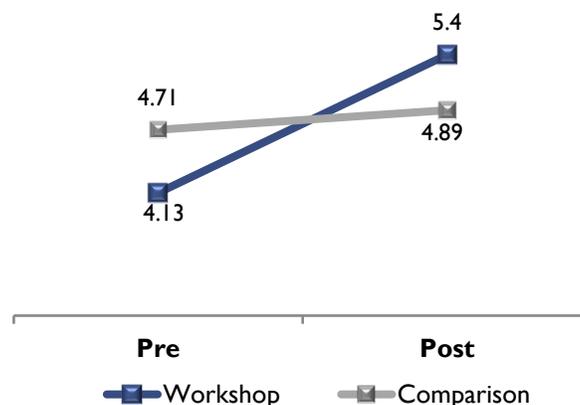
T run where initial distributions did not meet parametric assumptions required for the related samples *t*-test. Using these tests, findings indicate that PD participants were significantly more confident in their ability to put workshop content and strategies into practice after attending workshops—both in general<sup>30</sup> and in the context of their specific classrooms<sup>31</sup> (see Table 8 below and Tables 18-21 in Appendix 5 for more detail).

Table 8: Mean Scores and Effect Sizes Related to Self-Efficacy

Group	Construct	Pre-mean (sd)	Post-mean (sd)	Effect size
Active	General self-efficacy	4.13 (1.01)	5.40 (1.00)	1.21
Active	Self-efficacy in context	4.70 (1.32)	5.50 (1.02)	0.68
Comparison	General self-efficacy	4.71 (1.05)	4.89 (1.00)	0.18
Comparison	Self-efficacy in context	4.90 (1.14)	5.03 (1.09)	0.11

However, survey respondents who did not attend IB workshops also reported higher general self-efficacy on the post-survey. However, a repeated measures ANOVA suggested this rate of change was significantly larger for IB workshop participants than for non-participants, as indicated by significant interactions between time (pre vs. post) and participation (active vs. comparison) for both general self-efficacy and self-efficacy in context. See Figures 14 and 15 below, and Tables 18-21 in Appendix 5 for more detail.

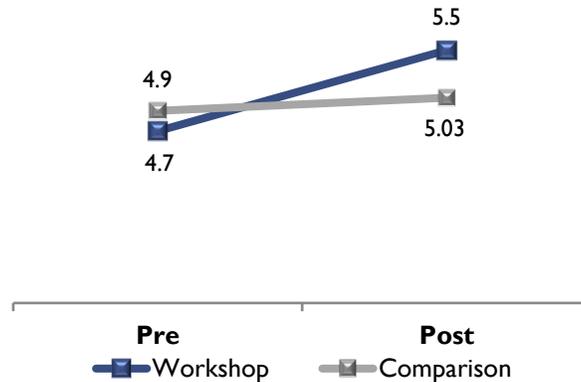
Figure 14: Change in Workshop-Related Self-Efficacy (General), Pre and Post (n = 156)



<sup>30</sup>  $t(96) = 10.43, p < .001$ .

<sup>31</sup>  $t(96) = 6.296, p < .001$ .

Figure 15: Change in Workshop-Related Self-Efficacy (Context-specific), Pre and Post (n = 156)



Changes in self-efficacy were the largest effects observed throughout this study (*effect size* for general self-efficacy = 1.21; *effect size* for context-specific self-efficacy = 0.68) and can be considered large using standard criteria for assessing the magnitude of effects. This is a promising sign given the wider research that suggests clear and consistent links between self-efficacy and instructional practice—particularly when these measures acknowledge the complexity of one’s current classroom context. For additional information on the role of self-efficacy in influencing teacher practice, please see the discussion in Calnin *et al.* (2017).

*Interviews:* As with other domains, three of the teachers interviewed described changes in self-efficacy after attending PD workshops. In this way, participating teachers described change in self-efficacy under three general categories: (1) becoming more **knowledgeable** about IB teaching strategies and intended student outcomes, which led the teacher to feel more secure using the strategies in practice; (2) understanding how IB content and strategies are **applicable** to their subject area; and (3) gaining **confidence** to try something new after observing workshop leaders model new strategies.

- “I’m more secure in myself about what is expected of the students and what I need to deliver to them. I was reassured by that, because it had been five or six years since I taught DP. So it helped me get back into the kind of zone of what to expect by the DP.” DP teacher, High change
- “It’s given me a lot more scope of how I can actually be a lot more interdisciplinary with my planning and not to go, “Well, I’m just the language teacher and what I do is sort of sit outside of what everyone else does.” PYP teacher, High change
- “The workshop, it always inspires me to try it in the classroom, whatever the leaders show us or gives examples [of]. It always inspires me to try it in the classroom and to see how it works for me.” PYP teacher, Low change

These comments are consistent with survey findings, which suggest that PD participants tend to be more confident in their ability to put workshop content and strategies into practice after attending the workshops.



### **Collective self-efficacy**

**Summary.** After attending PD workshops, participants were significantly more confident in their school's collective ability to implement workshop content and strategies, although the effect size was relatively small. These differences were not observed among those who did not attend the workshops.

Collective self-efficacy refers to a group of teachers' beliefs that, as a collective, they have the capabilities to accomplish chosen tasks and achieve their goals (Bandura, 1986). In the context of schools, recent research (e.g., Hattie, 2012) suggests that collective self-efficacy is one of the strongest influences on student achievement—and has an effect size that is larger than some demographic variables.

For this reason, the research team incorporated a 7-item measure of 'workshop-specific' collective self-efficacy as part of this study.<sup>32</sup> This was included using the rationale that if the IB's professional development workshops also showed improvements in teachers' views about collective self-efficacy, this would provide further evidence in support of the positive impact of the IB's professional development. As in other areas, these seven items were combined into a composite variable<sup>33</sup> measuring collective self-efficacy and compared across the pre- and post-surveys. An exploratory factor analysis indicated support for the scale's one factor structure (see Table 9 in Appendix 4); hence, all seven items were combined into one overall collective self-efficacy score.

Using this approach, mean collective self-efficacy scores among those attending workshops were higher ( $m = 5.10$ ;  $SD = 1.47$ ) on the post-survey than they were on the pre-survey ( $m = 4.70$ ;  $SD = 1.60$ ),<sup>34</sup> and similar changes were not observed among those in the comparison group (post  $m = 4.48$ ,  $SD = 1.41$ ; pre  $m = 4.44$ ,  $SD = 1.51$ ) as illustrated in Figure 16 below.

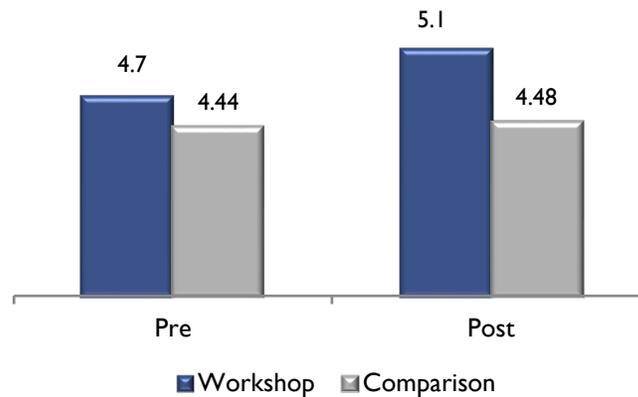
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<sup>32</sup> Items presented as: Think about the collective team of teachers at your school. How much do you disagree or agree that the collective team of teachers at your school...[insert workshop-specific goals and strategies].

<sup>33</sup> Pre  $\alpha = .979$ ; post  $\alpha = .978$ .

<sup>34</sup>  $t(96) = 2.96$ ,  $p = .004$ . Also supported by a repeated measures analysis of variance exploring the differential change in collective self-efficacy from the pre- to post-survey across those who attended (and did not attend) the PD workshops. Effect for interaction between time and Active vs Control condition,  $F(1,154) = 4.516$ ,  $p < .035$ .

Figure 16: Change in Collective Self-Efficacy, Pre and Post (n=156)



### Overall Change

To provide an overall, high-level understanding of participant outcomes after attending IB professional development workshops, CPE created two overall outcome indicators: one representing participant outcomes before attending a PD workshop (i.e., the pre-survey) and representing participant outcomes after attending their PD workshop (i.e., the post-survey). This overall indicator is reported on a 7-point scale (where higher values reflect more positive scores) and was created by averaging participant scores from the following variables:

- Attitudes towards the IB
- Specific attitudes
- General attitudes
- Beliefs
- Workshop-specific self-efficacy
- Workshop-specific collective self-efficacy.

Due to the prevalence of missing data on knowledge items, the overall knowledge variable was *not* incorporated into these overall calculations.

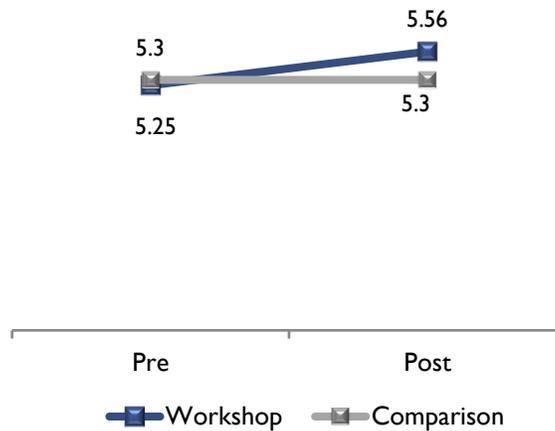
Using these overall variables, paired samples *t*-tests were used to compare pre- and post-survey scores as a way to explore overall change before and after the workshops. Findings indicate that for workshop participants, overall PD outcome scores were significantly higher on the post-test ( $m = 5.56, SD = .745$ ) than on the pre-test ( $m = 5.25, SD = 0.70$ ).<sup>35</sup> Similar changes were not observed

<sup>35</sup>  $t(97) = 5.934, p < .001$ .



among those in the comparison group (pre-survey  $m = 5.30$ ,  $SD = .71$ ; post-survey  $m = 5.30$ ,  $SD = .68$ ; see Figure 17).

Figure 17: Overall Change, Pre and Post



For those attending workshops, this change represents a small to moderate effect size of 0.42, which is promising and has the potential to be improved.

### Context and Mechanisms

Given the wide range of contexts in which IB World Schools operate, the current study also drew upon a Realist Approach (Pawson & Tilley, 1997) to inform its design and analysis. Realist approaches are grounded in the notion that context matters (Pawson & Tilley, 1997) and that many social programs work for some people in some contexts at some times.

Acknowledging this, realist approaches seek to identify the contexts that help support (or inhibit) program outcomes, while also identifying the specific implementation mechanisms that similarly support (or inhibit) program outcomes.

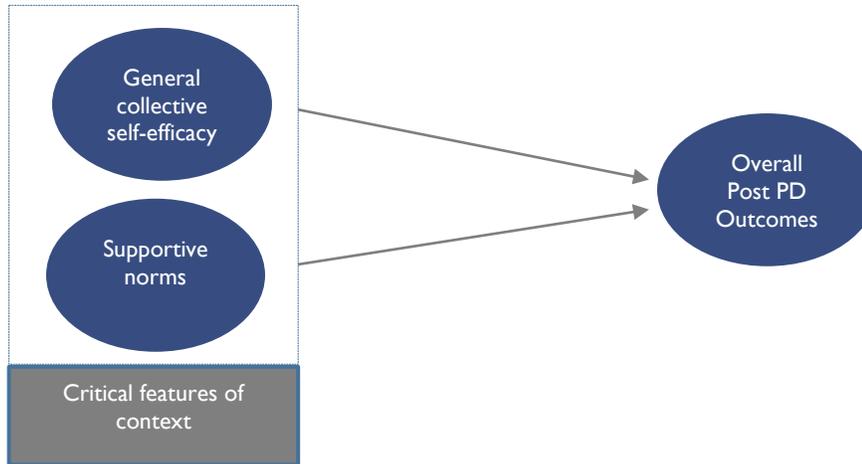
Drawing on this approach, the research team conducted a number of additional analyses to identify those features of context that supported PD outcomes in this sample, and those implementation mechanisms that also appeared to facilitate intended effects within this sample.

These analyses included a series of multiple regression analyses testing the relationship between contextual features and implementation mechanisms and the overall PD outcomes. These are described in more detail in Appendix 6.

## Context

Using this approach, two features of context emerged as critical factors that support strong professional development outcomes (see Figure 18).

Figure 18: Contextual features that support PD outcomes<sup>36</sup>



That is:

- **Supportive norms:** Where teachers felt the broader school environment (a) encouraged educators to put what they learn during workshops into practice, (b) demonstrated the expectation that educators put what they learn during workshops into practice, and (c) embedded accountability mechanisms to ensure that teachers do put what they have learned into practice, teachers reported higher overall outcomes after attending PD workshops.<sup>37</sup>
- **Collective self-efficacy:** Additionally, where teachers feel their school was generally well-placed to accomplish chosen tasks and achieve their goals—more broadly than workshop content itself—teachers reported higher overall outcomes after attending PD workshops.<sup>38</sup>

Overall, these contextual features (Norms, Collective Self-efficacy, and in addition, Leadership) accounted for 17.6 per cent of the variance in post-survey teacher PD outcomes.

<sup>36</sup> Accounting for Overall Pre-PD Outcomes (a composite of all the pre-survey variables, excluding knowledge items) and Leadership Quality as reported in the Pre-Survey.

<sup>37</sup> Beta value 0.402,  $t = 5.512$ ,  $p < .001$ . Accounting for Overall Pre score, Pre leadership, collective self-efficacy.

<sup>38</sup> Beta value 0.859,  $t = 3.192$ ,  $p = .002$ . Accounting for Overall Pre score, Pre leadership, Norms.



Additional contextual features that were examined but were *not* related to PD outcomes in this particular sample. included:

- Years teaching at an IB school
- Years teaching at current school
- Years teaching in PYP/MYP/DP (whichever was relevant to the specific workshop)
- Workshop attended (PYP/MYP/DP)
- Whether the teacher was currently teaching in the PYP/MYP/DP
- Whether the teacher attended individually or in a group
- Whether the teacher was required to attend the workshop (rather than voluntarily opting into attendance).

These findings suggest that the broader school environment—and particularly the broader norms and expectations around what teachers do as a result of attending workshops—may be more influential than individual teacher factors, such as years of experience or tenure, when influencing PD outcomes, at least for those in this sample.

*Interviews:* Interestingly, there are commonalities across these findings and comments that emerged during teacher interviews. Among those teachers categorised as “high change” using pre- and post-survey comparisons, two teachers described similar contextual factors present at their schools: specifically, the expectation that attendees should (1) share what they had learned, and (2) put what they learned into practice.

For example, teachers mentioned:

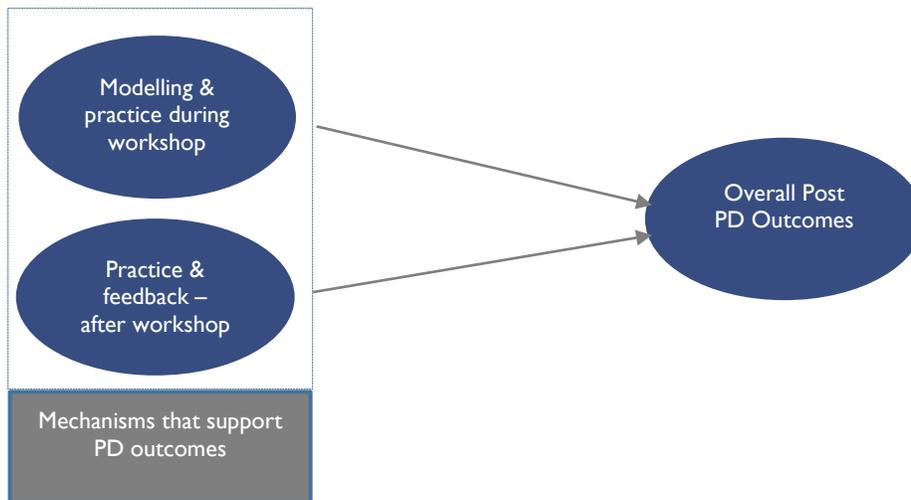
- *“My biggest thought leaving the workshop was I was so fired up, so pumped up, about this new knowledge and wanting to implement it into my teaching. And then going back to school and like I said, our Director of Academic Affairs was at the workshop so part of what we were trying to do at our school is revamp our whole program and understanding of ATL skills and how we can implement them across our school.”* MYP teacher, High change
- *“We came back and did a mini ATL workshop at our school, just to share what we had learned. Honestly, there were some teachers in there who have been at our school and taught in the IB for 5-8+ years and they were like, “Wow, I did not know those things about ATLs. I didn't realise this or that.”* MYP teacher, High change

Comparatively, teachers who did not demonstrate high change based on the quantitative surveys did not explicitly mention the presence of these contextual features as facilitating factors.

## Mechanisms

Additionally, two specific mechanisms (also appeared to be related to stronger PD outcomes: (1) modelling and practice (during the workshop), and (2) opportunities for practice and feedback – after the workshop (see Figure 19).

Figure 19: Mechanisms that support PD outcomes<sup>39</sup>



Specifically:

- *Modelling & practice – during workshop*: when participants had opportunities to practise applying workshop content; or to observe workshop leaders model workshop strategies during the workshop itself, post-survey outcomes tended to be higher.<sup>40</sup>
- *Practice & feedback – after workshop*: when participants had opportunities to practise applying workshop strategies, and to obtain feedback on their efforts after attending workshops, outcomes also tended to be higher.<sup>41</sup>

Overall, these two mechanisms (modelling & practice, plus practice and feedback) accounted for eight per cent of the variance in post-survey teacher PD outcomes.

<sup>39</sup> Accounting for Overall Pre-PD Outcomes (a composite of all the pre-survey variables, excluding knowledge items) and Leadership Quality as reported in the Pre-Survey.

<sup>40</sup>  $Beta = .208, t=2.536, p = .013$ . Accounting for Overall Pre Score and Practice & Feedback – After Workshop.

<sup>41</sup>  $Beta = .172, t=2.096, p = .039$ . Accounting for Overall Pre Score and Modelling & Practice – During Workshop.



### ***The role of workshop leaders***

Understandably, workshop leaders are at the core of the IB's professional development model. Workshop leaders represent the 'face' of IB professional development and play a critical role in translating its underlying theory into practice.

For this reason, the research team endeavoured to explore the role of workshop leaders in supporting PD outcomes. To this end we conducted an online survey of workshop leaders which was used to connect background factors about workshop leaders to participant survey responses.

This survey explored workshop leader:

- Attitudes towards the IB;
- Attitudes about the specific workshop;
- Self-efficacy with respect to workshop delivery;
- Confidence utilising IB expected pedagogical approaches (as outlined in the program model developed in Phase 1 of this study);
- Self-reported practice during the workshop (i.e., the extent to which they employed expected pedagogical approaches, such as the use of social constructivist strategies, peer-to-peer discussion, modelling and feedback); and
- Views on the quality of training they received when becoming a workshop leader.

Fourteen workshop leaders who had led relevant workshops during the data collection period completed the online survey. These 14 workshop leaders were then connected to 32 participants who attended these workshops and completed both the pre- and post-surveys.

Using a series of hierarchical multiple regression models, each of the above constructs was tested to explore the relationship between these constructs and overall PD outcomes,<sup>42</sup> when accounting for initial, pre-survey scores. However, likely due to the small number of participants who could be matched to their workshop leader, and the limited variability in workshop leader responses, none of these factors was a significant predictor of post-survey outcomes. Additional detail on these analyses can be found in Appendix 5.

Among this limited set of workshop leader responses, workshop leaders reported fairly consistent use of the expected pedagogical approaches, positive attitudes towards the IB, positive attitudes towards their workshops, and a relatively high degree of confidence in their ability to deliver the required workshops well (see Figures 20 and 21).

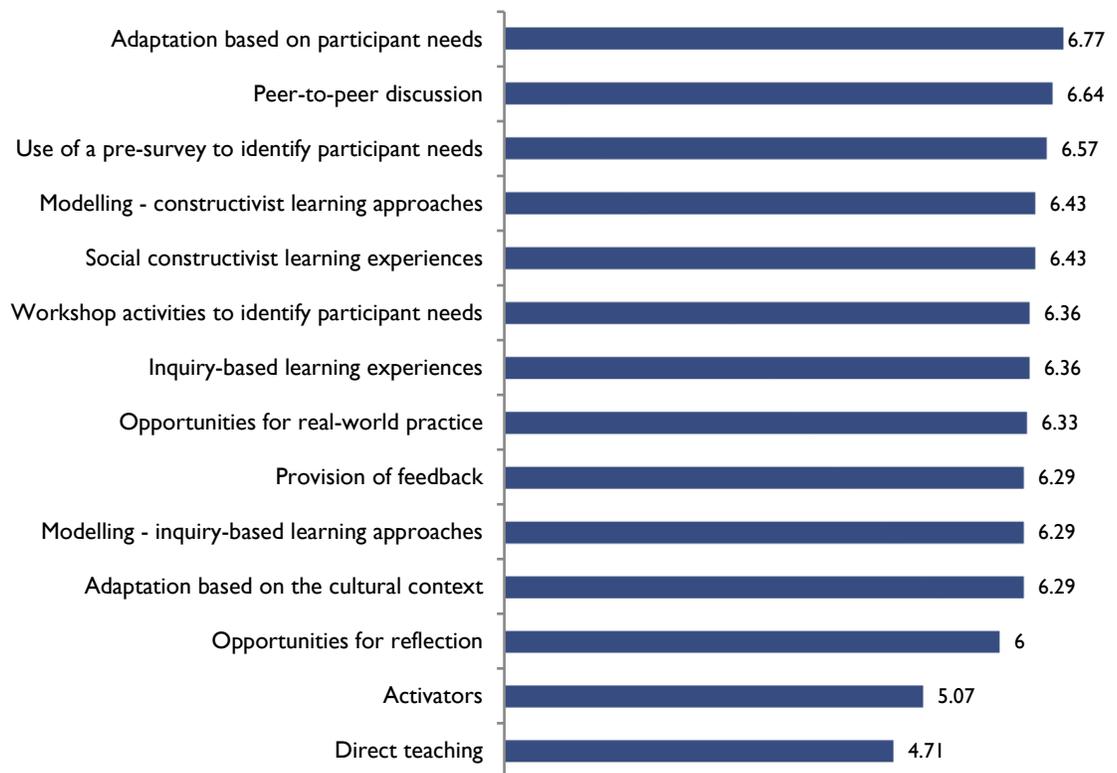
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<sup>42</sup> Because only 20 workshop leaders completed the online survey, the sample size was too small to run factor analyses.



However, workshop leader reports on the quality of the training they received were not quite as positive as other aspects of their survey responses (see Figure 22). With that said, lower-rated responses tended to focus on the length of the workshop ( $m = 5.00$ ), its relevance ( $m = 5.64$ ) and overall quality ( $m = 5.86$ ), with open ended suggestions on strategies for improving the workshop leader training varying considerably but touching on a need for additional follow up after initial training ( $n = 2$ ), more specific tools/exemplars/practical strategies ( $n = 2$ ) and a greater focus on adult learning and group dynamics ( $n = 2$ ).

Figure 20: Workshop leader self-report – frequency of use during recent workshop ( $n = 14$ )\*<sup>43</sup>

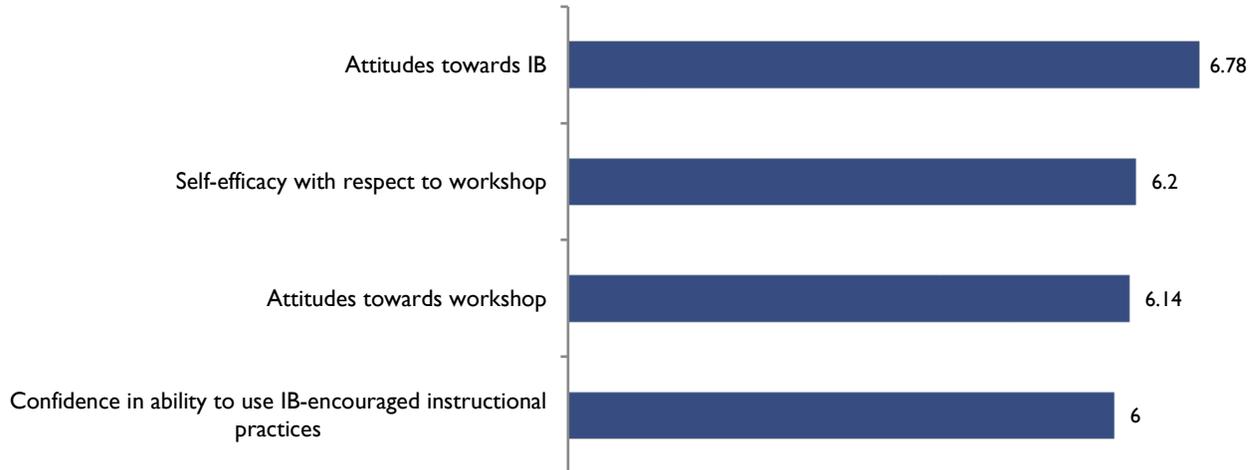


\*7-point scale; 1 =not at all; 7 = a great deal

<sup>43</sup> These practices were extracted from the program theory/logic model developed in Phase 1 of this study.

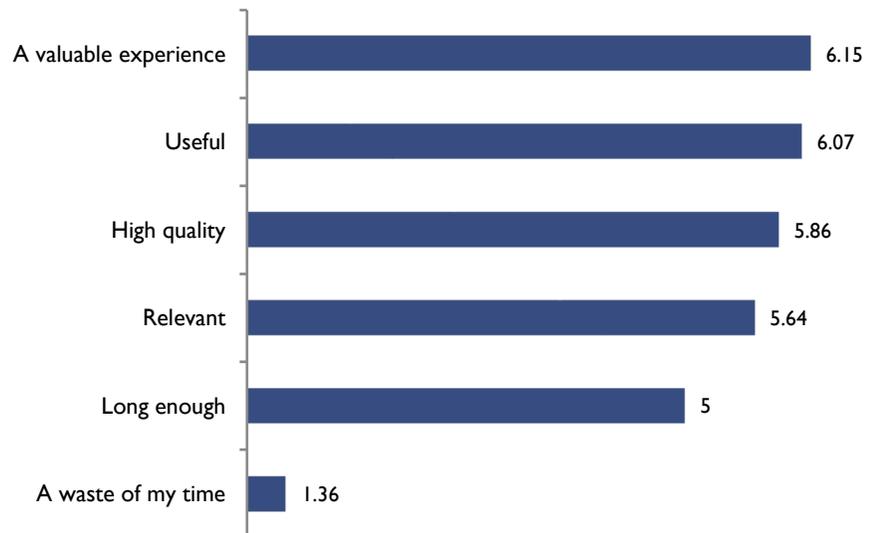


Figure 21: Workshop attitudes (n = 13-15)\*



\*Composite items; where higher scores indicate more positive views<sup>44</sup>

Figure 22: Perceptions of workshop leader training quality (n = 13-15)\*



\*Composite items; where higher scores indicate more positive views, except on item 'a waste of my time'.

<sup>44</sup> Attitudes towards IB, composite of 5 items. Attitudes towards the workshop, composite of 6 items. Self-efficacy with respect to workshop, 4 items. Confidence in ability to use IB instructional approaches, 14 items derived from the program model/program theory.



## Section 6: Conclusions

The current report provides findings on the study's first five research questions:

1. **IB PD Model:** What does IB's model for professional development look like in theory?
2. **Critical Features:** What does the research literature identify as critical features of high-quality professional development?
3. **Theory-to-Practice:** How do IB models compare to professional development best practices?
4. **Knowledge, attitudes, beliefs:** What is the difference in teacher knowledge, attitudes and beliefs before and after participation in IB face-to-face workshops?
5. **Self-efficacy:** (a) What is the difference in teachers' levels of self-efficacy before and after participation in face-to-face workshops? (b) What is the difference in schools' collective self-efficacy before and after their teachers participate in face-to-face IB workshops?

Findings from Phase 1 and 2 suggest there is good alignment between IB professional development and research on best practice in some domains, but clear gaps in others. In this way, current findings indicate a number of clear areas for future review and consideration, including potential for:

- Integrating opportunities for practice and feedback
- Engaging school leadership in the IB's professional learning process
- Supporting workshop leaders to target teacher attitudes and beliefs throughout the workshop process
- Considering whether workshop length is sufficient to effect sustained change in teacher practice and student learning
- Supporting greater connections between PD and educators' everyday workloads
- Exploring strategies for building shared understanding of PD content among networks of teachers within schools
- Exploring strategies for embedding supports that allow workshop leaders to acknowledge and adapt based on participants' diverse cultural contexts.

Table 9 sets out a list of areas for future consideration based on these findings. This list of 'areas for future consideration' is presented as a series of questions, and is intended to be used by relevant members the Research Advisory Committee and the IB PD department as part of ongoing discussion, debate and reflection on the IB's ongoing professional development work.



Table 9: Areas for future consideration

1. Integrating opportunities for practice and feedback	Are there opportunities to embed practice and feedback into the IB PD model, either before, during or after the workshop period? Is there a way to capitalise on blended and online learning opportunities to create opportunities for practice and feedback?
2. Supporting workshop leaders to target teacher attitudes and beliefs throughout the workshop process.	Is there a way to capitalise on the participant pre-workshop survey to identify relevant teacher attitudes and beliefs so these can be targeted throughout the workshop process? Are there opportunities to provide workshop leaders with background information on relevant teacher attitudes/beliefs and practical strategies, based on empirical research, for shifting these?
3. Consider whether workshop length is sufficient to effect sustained change in teacher practice and student learning.	Reflecting on the literature described in this paper, is workshop length sufficient for the IB's purposes? Are there opportunities to expand the length of professional learning opportunities, for example through blended or online learning opportunities as supplements to face-to-face workshops?
4. Support greater connections between PD and educators' everyday workloads.	Are there opportunities for expanding the role of in-school training and how might the IB support these connections? How might the IB support greater alignment between teachers' everyday workloads and their involvement in professional learning?
5. Explore strategies for building shared understanding of PD content among networks of teachers within schools	Are there explicit strategies that might be embedded into the PD model that would allow the IB to build a shared understanding of PD content among teachers <i>within</i> schools? What systems, structures and supports encourage teachers to share what they have learned at PD workshops and what systems, structures and supports <i>discourage</i> teachers from doing so?
6. Explore strategies for embedding supports that allow workshop leaders to acknowledge and adapt based on participants' diverse cultural contexts.	Are there opportunities to supplement workshop leader training that might enhance workshop leaders' capacity to acknowledge and adapt workshop content based on participants' cultural contexts? In what ways might the IB create opportunities for workshop leaders to practice this recognition and adaptation? What support materials could the IB produce that might assist workshop leaders towards this goal?

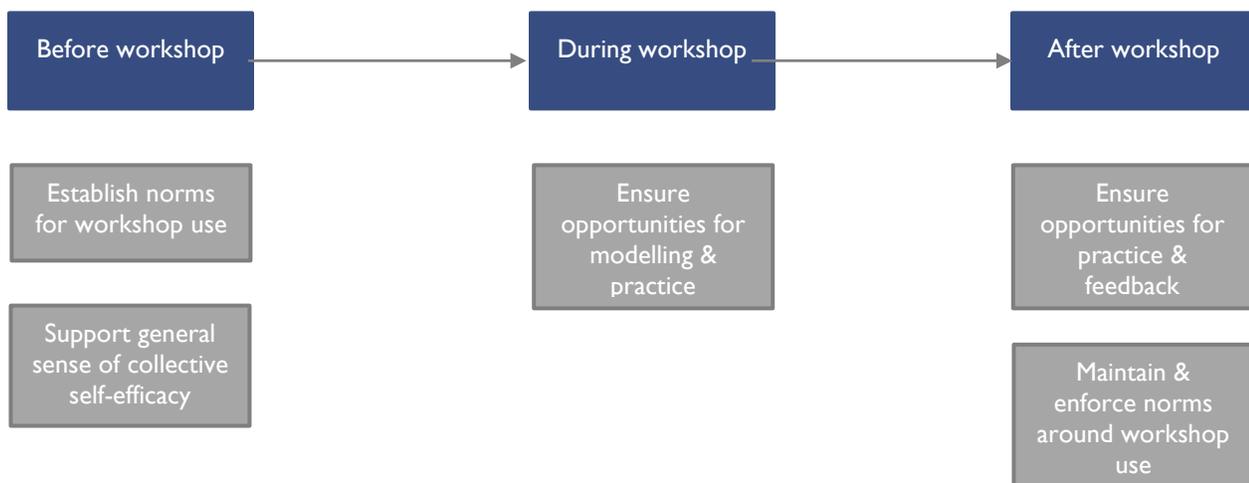


Given the critical role self-efficacy and collective self-efficacy play in supporting educator practice, findings from Outcome Study 1 are an initial and positive indication of the potential for IB professional development to shape instructional practice at IB World Schools. However, relatively limited changes in attitudes, beliefs and knowledge that were observed as part of this study. While changes in self-efficacy and collective self-efficacy are positive, attitudes, beliefs and knowledge also play a critical role in supporting educator practice and therefore warrant additional focus, based on findings from this study.

### Partnerships for effective professional learning

Additionally, another key message emerging from this research is the idea that effective professional development is not the IB's responsibility alone. Instead, for participants in this study, strong professional development outcomes were supported by collaborative partnerships between the IB and its World School partners, and the integration of critical success factors before, during and after attendance at professional development workshops (see Figure 23). A critical consideration for the IB therefore becomes understanding how to best engage and support schools throughout this ongoing path of collaboration and professional learning.

Figure 23: Critical Success Factors in this Study: Before, During and After PD Workshops





## Recommendations

Based on these findings, the following recommendations are proposed for consideration. It is recommended that:

1. IB Professional Development work with IB World Schools to explore strategies for supporting positive school norms and strong expectations around the use of workshop content and strategies.
2. Related to this, it is recommended that IB PD consider working with IB World School leaders to help build understanding of what constitutes a positive school culture and how to build cultures that support strong norms and expectations within local contexts.
3. Consistent with findings from Phase 1 and Phase 2, it is recommended that IB review workshop design and QA processes to ensure that there are clear and consistent opportunities for participants to (a) observe high quality modelling of workshop content and strategies, and (b) to practise applying relevant content or strategies during the workshop experience.
4. Similarly, it is recommended that IB work with IB World Schools to explore opportunities for supporting and embedding structures for (a) practising what is learnt during workshops and (b) obtaining feedback on their efforts after PD workshops are complete.
5. Given that PD effects in this study were found smaller in relation with attitudes and beliefs, and these domains have not to date been deliberately targeted by IB PD, we suggest that IB also consider opportunities for embedding techniques that help workshop leaders identify and evaluate attitudes and beliefs (both positive and negative) into PD workshop leader training.
6. Finally, given the critical role that self-efficacy and collective self-efficacy play in supporting teacher practice, IB PD is encouraged to seek out a deeper understanding of self-efficacy and collective self-efficacy and strategies that might continue to support and deepen the relationship between IB workshops and changes in instructional practice.



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## Appendix I: Literature Review Methods

A review of relevant literature was completed in order to establish a collection of evidence-based characteristics of the characteristics of high-quality professional development. A literature search was undertaken using the Google Scholar, ERC, ERIC, and Scopus electronic databases. Key search terms included:

- teacher + professional development
- school + professional development
- teacher + continuing education
- teacher + professional learning;
- characteristics of effective professional learning
- education + professional learning
- professional development.

The first 50 results for each term and database were examined; beyond this point, quality and relevance of sources declined. The reference lists of reviewed sources were also examined to identify relevant research. The researchers also used their professional networks, and academics working in the field of professional development were contacted and recommended books, articles and other resources relevant to professional development. Each of the sources considered in terms of:

- their contexts
- the nature of the intervention
- the nature of the outcomes
- the mechanisms through which outcomes occur
- the magnitude and direction of the results
- The research method/s adopted.

The final nine categories emerged from this review of the literature as critical features of high-quality professional development.



## Appendix 2: Sources for Survey Design

Construct	Source, if relevant	Notes
Knowledge	UoM developed	Dependent on workshop selection; no validated workshop-specific items found elsewhere.
Attitudes	UoM developed	General and specific attitude items included. Both levels included given prior research on the predictive relationship between <b>specific</b> attitudes and behaviour (e.g. Ajzen, 2011)
Beliefs	UoM developed	Focuses on <b>outcome expectancy beliefs</b> related to the workshop because of the motivating role (and predictive relationship) between outcome expectancy beliefs and behaviour.  Item construction guided by Bandura (1986) on the form of outcome expectancy beliefs (i.e. positive, negative, physical, social and self-evaluative)
Self-efficacy	<b>General:</b> Norwegian Teacher Efficacy Scale (6 subscales, $\alpha$ values for subscales ranging from .77 to .91)  <b>Workshop-specific:</b> UoM developed	NTES selected because there is strong validation data available and because its items are consistent with Bandura's (2006) guidelines on developing self-efficacy items.  Workshop specific item development followed Bandura's guidelines.  Sources of self-efficacy items included so we can measure whether those factors that help build self-efficacy are in place.
Collective self-efficacy	<b>General:</b> Norwegian Teacher Efficacy Scale  <b>Workshop-specific:</b> UoM developed	Collective self-efficacy incorporated due to recent research (e.g. Hattie) that suggests collective self-efficacy plays a critical role in supporting teacher behaviours.



## Appendix 3: Survey Instruments

### IB PYP POST survey

#### **Study on the Impact of the IB's Professional Development**

Hello! And thank you for taking part in this survey.

My name is Gerard Calnin and I am a Senior Research Fellow at The University of Melbourne. My team and I have been commissioned by the IB to conduct a study on the impact of the IB's professional development workshops.

We are asking you to fill out this survey because you have recently completed the **Making the PYP Happen in the Classroom** workshop.

This survey will ask questions about your attitudes and beliefs regarding both the workshop and the IB more generally.

**Please answer openly and honestly!** All responses will remain confidential and no identifying data will be shared outside the research team. Your **honest** answers are critical to giving the IB an accurate picture of the effects of their professional development workshops.

#### **Before we begin, please complete this consent form**

1. I consent to participate in the Study on the Impact of the IB's Professional Development project, the particulars of which – including details of the survey – have been described to me in the Plain Language Statement. A written copy of the information has been given to me to keep.
2. I authorise the investigators to use my responses for the purpose of research.
3. I acknowledge that:
  - a. The possible effects of survey participation have been explained to me to my satisfaction;
  - b. I have been informed that I am free to withdraw from the project at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied;
  - c. The project is for the purpose of research;
  - d. I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements;
  - e. I will not be named in any reports or presentations arising from the research.

**Consent:** Please select 'Yes, I agree to participate' if you would like to continue with the survey.

- Yes** I agree to participate in this survey.
- No** I do not agree to participate in this survey.



To begin, we'd like to know your thoughts on the IB's approach to teaching and learning (social constructivist, inquiry-based, etc.).

**1. How would you describe the IB's approach to teaching and learning?**

	1	2	3	4	5	6	7	
Bad	<input type="radio"/>	Good						
Worthless	<input type="radio"/>	Valuable						
Ineffective	<input type="radio"/>	Effective						
Worst educational practice	<input type="radio"/>	Best educational practice						
Incoherent	<input type="radio"/>	Coherent						
Dated	<input type="radio"/>	Future oriented						

**2. Next, we'd like to know your thoughts about the workshop Making the PYP Happen in the Classroom.**

According to IB materials, the goals for this workshop are to help teachers and administrators:

- a. Develop personal knowledge of the essential elements in the PYP
- b. Deepen understanding of international mindedness
- c. Deepen understanding of the learner profile
- d. Prepare for planning, teaching and assessing students
- e. Develop skills to analyse and refine the school's programme of inquiry.

Think about this list of goals **overall**.

Reflecting on this list of goals, how would you describe the material being taught in this workshop?



	1	2	3	4	5	6	7	
Bad	<input type="radio"/>	Good						
Worthless	<input type="radio"/>	Valuable						
Hard	<input type="radio"/>	Easy						
Irrelevant	<input type="radio"/>	Relevant						

**3. Think about each goal one-by-one.**

**How unimportant or important are the following goals for you in your classroom at your school?**

	1- Not important at all	2	3	4	5	6	7- Very Important
Understanding the essential elements in the PYP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding international mindedness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding the learner profile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowing how to plan using the PYP framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowing how to teach within the PYP framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowing how to assess students using the PYP framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowing how to analyse and refine my school's programme of inquiry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Thank you for your help so far; your input will help us learn more about whether the IB’s professional development workshops have an impact on teacher attitudes and beliefs.

In this section we’d like to know how confident you feel about putting the workshop goals into practice.

4. How much do you **disagree** or **agree** with the following?

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
I understand the essential elements in the PYP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand international mindedness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand the learner profile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how to plan using the PYP framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how to teach the PYP framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how to assess students using the PYP framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how to analyse and refine my school’s programme of inquiry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**5. Think about your current ability to implement the PYP as described in 'Making the PYP Happen'.**

How much do you **disagree** or **agree** with the following?

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
I can implement the PYP within my <b>current school environment</b> .	<input type="radio"/>						
I can implement the PYP while also meeting my <b>other teaching commitments</b> .	<input type="radio"/>						
I can implement the PYP with the <b>resources</b> I currently have available.	<input type="radio"/>						
I can implement the PYP even in <b>mixed ability</b> classes.	<input type="radio"/>						
<b>I can implement the PYP without extra support</b> from colleagues at my school	<input type="radio"/>						

**6. Now, think about the collective team of teachers at your school.**

How much do you **disagree** or **agree** that the collective team of teachers at your school...

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
Understands the essential elements in the PYP	<input type="radio"/>						
Understands international mindedness	<input type="radio"/>						
Understands the learner profile	<input type="radio"/>						



Knows how to plan using the PYP framework

Knows how to teach within the PYP framework

Know show to assess students using the PYP framework

Knows how to analyse and refine my school's programme of inquiry

**Think about what would happen if the workshop goals were achieved as intended. For example, if you learned what the workshop leaders intended you to learn, gained the skills they hoped you to gain, and changed in the ways they hoped (etc.)**

**Goals:**

- a. Develop personal knowledge of and understanding of the essential elements in the PYP
- b. Deepen understanding of international mindedness and the learner profile
- c. Prepare for planning, teaching and assessing students
- d. Develop skills to analyse and refine the school's programme of inquiry

**7. How much do you disagree or agree with the following?**

*If I put the workshop objectives into practice, I expect that...*

	1- Strongly disagree	2	3	4	6	7- Strongly agree
Student learning would improve	<input type="radio"/>					
My teaching would better align with the IB teaching philosophy	<input type="radio"/>					
My school would have a more collaborative	<input type="radio"/>					



teaching environment

My supervisor/s (e.g. head of department) would acknowledge my effort

I would fall behind on my other commitments

I would have to work longer hours

I would be a more effective teacher

<input type="radio"/>						
<input type="radio"/>						
<input type="radio"/>						
<input type="radio"/>						

Next, we'd like to understand your views on the PYP framework in a little more detail.

**8. In your own words, briefly describe the essential elements and how they relate to student learning in the PYP.**

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**9. Which of the following are true about international mindedness? (select all that apply)**

- PYP schools must adopt the IB's definition of international mindedness
- The attributes of international mindedness are reflected in the learner profile
- Assessment in the PYP should drive curriculum, teaching practice, and learning strategies
- Assessment in the PYP should only be summative
- Six units of inquiry – one for each transdisciplinary theme – should be addressed each year

**10. Please identify one attribute of the IB learner profile, then describe two strategies that could be used to support the development of students' acquisition of this attribute.**

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This next section presents a number of scenarios.

Please read each scenario, then respond to the questions below.

**Scenario 1**

You have just been hired at a new school because you have an understanding of the PYP framework. During orientation week you are provided with a set of government-issued textbooks and are told you must teach from these textbooks under the national curriculum.

Given your understanding of the PYP, how would you respond to this scenario?

**11. Please select the most appropriate response.**

- The national curriculum is the national curriculum. You do what you're told and teach from the textbooks
- Independently, figure out how you can set the conceptually-driven knowledge of the PYP against the textbooks and amend your own unit planning
- Learn about the culture of the school and, in partnership with other teachers, seek to set the conceptually-driven knowledge of the PYP against the textbooks
- Approach the PYP Coordinator and ask for advice on how to embed the PYP framework into what is expected under the national curriculum

**12. Please explain why this is the most appropriate response.**

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**13. Please select the least appropriate response.**

- The national curriculum is the national curriculum. You do what you're told and teach from the textbooks
- Independently, figure out how you can set the conceptually-driven knowledge of the PYP against the textbooks and amend your own unit planning
- Learn about the culture of the school and, in partnership with other teachers, seek to set the conceptually-driven knowledge of the PYP against the textbooks
- Approach the PYP Coordinator and ask for advice on how to embed the PYP framework into what is expected under the national curriculum.



14. Please explain why this is the **least** appropriate response.

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**Scenario 2**

Early in a new school year you begin teaching a class one morning. Fairly soon it becomes obvious that your students already know the content and concepts you were planning to explore throughout the class.

Given your understanding of the PYP framework, how would you respond to this scenario?

15. Please select the **most** appropriate response.

- Continue with the lesson as planned, then later that afternoon amend your plan for the next day to better reflect current student understanding
- As soon as you realise the students already know the content, amend your plan for the day and move on to more complex material
- Continue with the lesson as planned, make a note that this happened to help inform your planning for next year.
- As soon as you realise students already know the content, amend your plan for the day, then later that afternoon design a formative assessment that will allow you to target your next activities to students' current understanding

16. Please explain why this is the **most** appropriate response.

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17. Please select the **least** appropriate response.

- Continue with the lesson as planned, then later that afternoon amend your plan for the next day to better reflect current student understanding
- As soon as you realise the students already know the content, amend your plan for the day and move on to more complex material
- Continue with the lesson as planned, make a note that this happened to help inform your planning for next year
- As soon as you realise students already know the content, amend your plan for the day, then later that afternoon design a formative assessment that will allow you to target your next activities to students' current understanding



**18. Please explain why this is the least appropriate response.**

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**Thank you for your help so far!**

**19. Thinking about the upcoming workshop, how much do you disagree or agree with the following statements?**

Overall the workshop I attended was...

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
Relevant	<input type="radio"/>						
Useful	<input type="radio"/>						
A waste of my time	<input type="radio"/>						
High quality	<input type="radio"/>						

**20. How much do you disagree or agree with the following statements?**

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
During the workshop, I had the opportunity to practise what I learned	<input type="radio"/>						
The workshop leaders modelled how to put these objectives into practice.	<input type="radio"/>						
Since the workshop, I have had the opportunity to practice what I learned	<input type="radio"/>						



Since the workshop I have seen others put workshop learning into practice.

I have received feedback on my efforts to put workshop learning into practice.

I am reluctant to try apply what I learned during the workshop in my classroom.

I get anxious when I think about trying what I learned during the workshop.

I know I can overcome the challenges that will come up when I put what I learned into practice.

**21. How much do you disagree or agree with the following statements?**

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
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Since the workshop I have shared what I learned with others at my school.

Since the workshop I have encouraged others at my school to put what I/we learned into practice.



**22. How much do you disagree or agree with the following statements?**

At my school...

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
I am encouraged to put what I learned into practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am expected to put what I learned into practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are negative consequences if I do not put what I learned into practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**23. Did you attend the workshop with any other teachers from your school?**

- No
- Yes \_\_\_\_\_

**24. Was it compulsory that you attend this workshop?**

- No
- Yes

*Display This Question:*

*If 24. Was it compulsory that you attend this workshop? = Yes*

**25. Who required you to attend this workshop?**

- My School
- The IB
- Other \_\_\_\_\_

*Display This Question:*

*If 24. Was it compulsory that you attend this workshop? = No*



**25. Why did you choose to attend this workshop?**

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**You are now very close to the end. In this section, we ask a few questions about your views about yourself as a teacher more generally.**

**26. In general, how uncertain or certain are you that you can:**

	1- Not certain at all	2	3	4	5	6	7- Absolutely certain
Explain central themes in your lessons so that even the low ability students understand	<input type="radio"/>						
Provide good guidance and instruction to all students regardless of their level of ability	<input type="radio"/>						
Provide realistic challenge for all students even in mixed ability classes	<input type="radio"/>						
Adapt instruction to the needs of low-ability students while you also attend to the needs of other students in class	<input type="radio"/>						
Get all students in class to engage with their school work	<input type="radio"/>						
Motivate students who	<input type="radio"/>						



show low  
interest in  
schoolwork

Maintain  
discipline in  
any school  
class or group  
of students

Get students  
with  
behavioural  
problems to  
follow  
classroom  
rules

Find adequate  
solutions to  
conflicts with  
other teachers

Collaborate  
effectively and  
constructively  
with other  
teachers, for  
example, in  
teaching teams

Successfully  
use any  
instructional  
method that  
the school  
decides to  
adopt

Manage  
instruction  
regardless of  
how it is  
organised  
(group  
composition,  
mixed age  
groups, etc.)

<input type="radio"/>						
<input type="radio"/>						
<input type="radio"/>						
<input type="radio"/>						
<input type="radio"/>						
<input type="radio"/>						



**27. Think about the collective team of teachers at your school overall.**

How uncertain or certain are you that:

	1- Not certain at all	2	3	4	5	6	7- Absolutely certain
We can get even the most difficult pupils engaged in their schoolwork	<input type="radio"/>						
We handle conflicts constructively because we work as a team	<input type="radio"/>						
We have a common set of rules and regulations that enable us to handle disciplinary problems successfully	<input type="radio"/>						
At this school we are able to create a safe and inclusive atmosphere even in the most difficult cases	<input type="radio"/>						
Teachers at this school succeed in teaching even to low-ability pupils	<input type="radio"/>						
Take collective responsibility for the learning progress of all students	<input type="radio"/>						



**28. Now think about your school overall.**

**How much do you disagree or agree with the following:**

*At my school....*

	1- Strongly Disagree	2	3	4	5	6	7- Strongly Agree
Our principal uses research to improve teaching/learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our principal learns alongside teachers about how to improve teaching/learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teacher appraisals focus on improving teaching practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teacher appraisals focus on improving student outcomes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decisions about teaching approaches are based on evidence about their impact on the learner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student achievement patterns are used to plan professional learning practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teachers use a range of evidence sources to evaluate the effectiveness of their teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional development is evaluated in terms of its impact on the learner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



In this last section, we would like to learn about you.

**29. What is your current role?**

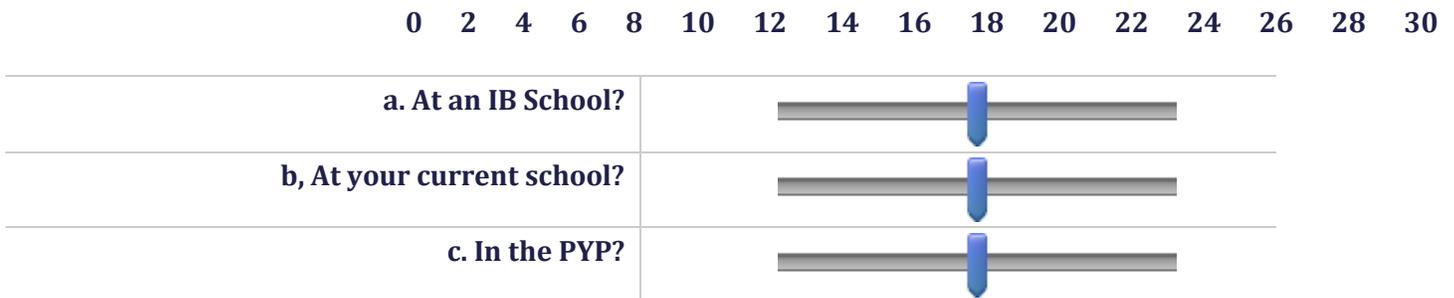
- a. Teacher
- b. Coordinator
- c. Principal (School Leader)
- d. Other: \_\_\_\_\_

**30. Are you currently teaching within the Primary Years Programme at your school?**

- No
- Yes

**31. How many years teaching experience do you have...**

*Please slide the bar to the relevant number of years for each of the categories below*



**32. What is the highest level of education you have completed?**

- a. High School
- b. Associate degree / some university or college
- c. Bachelor's degree
- d. Masters/Professional degree
- e. Doctorate/PhD
- f. Other: \_\_\_\_\_



**33. What is your gender?**

- a. Male
- b. Female
- c. Prefer not to respond

**34. Would you be willing to participate in later stages of the study?** (For example, phone interviews or classroom observations. **Note** that we are exploring innovative strategies for conducting classroom observations that don't require us to be in your classroom).

- Yes
- Maybe
- No

**Thank you very much for your participation! It is immensely helpful for the IB community and will help build knowledge about how teachers change as a result of PD workshops.**



## Appendix 4: Exploratory Factor Analyses

All Exploratory Factor Analyses run using Principal Axis Factoring with Oblimin rotations.

*Note: some cross-loading, where loading is defined as being equal to or greater than a loading of .350/-.350. Where items cross-loaded these were retained in Factor 3 (General Attitudes) rather than in Factor 1. As a result, this cross-loading should be recognised as a limitation of the measurement tool.*

### Attitudes

Table 3: Exploratory Factor Analysis run on Attitude Items

Factor	Total Variance Explained			
	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	9.046	53.209	53.209	7.02
2	2.111	12.416	65.625	7.099
3	1.746	10.271	75.896	2.079
4	0.814	4.787	80.683	
5	0.686	4.036	84.719	
6	0.555	3.263	87.982	
7	0.359	2.112	90.093	
8	0.297	1.745	91.838	
9	0.284	1.668	93.507	
10	0.24	1.41	94.916	
11	0.205	1.207	96.123	
12	0.161	0.946	97.069	
13	0.149	0.878	97.947	
14	0.133	0.784	98.73	
15	0.094	0.552	99.282	
16	0.068	0.401	99.682	
17	0.054	0.318	100	



Table 4: Factor Loadings, Attitude Items

Item	Factor Loading		
	Factor 1: Attitudes towards IB	Factor 2: Specific Attitudes	Factor 3: General Attitudes
PRE_Att_IB_1	<b>0.906</b>		
PRE_Att_IB_2	<b>0.861</b>		
PRE_Att_IB_3	<b>0.843</b>		
PRE_Att_IB_4	<b>0.806</b>		
PRE_Att_IB_5	<b>0.816</b>		
PRE_Att_IB_6	<b>0.713</b>		
PRE_Att_Gen_1	0.408*		<b>0.540</b>
PRE_Att_Gen_2	0.393*		<b>0.700</b>
PRE_Att_Gen_3			<b>-0.351</b>
PRE_Att_Gen_4			<b>0.564</b>
PRE_Att_Specific_1		<b>0.732</b>	
PRE_Att_Specific_2		<b>0.577</b>	
PRE_Att_Specific_3		<b>0.713</b>	
PRE_Att_Specific_4		<b>0.901</b>	
PRE_Att_Specific_5		<b>0.831</b>	
PRE_Att_Specific_7		<b>0.911</b>	
PRE_Att_Specific_8		<b>0.880</b>	

*\*note: some cross-loading, where loading is defined as being equal to or greater than a loading of .350/-.350*



## Beliefs

Table 5: Exploratory Factor Analysis run on Belief Items

Total Variance Explained				
Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	3.522	50.309	50.309	3.186
2	1.766	25.231	75.54	1.600
3	0.668	9.539	85.079	
4	0.385	5.501	90.58	
5	0.298	4.256	94.836	
6	0.224	3.207	98.043	
7	0.137	1.957	100	

Table 6: Factor Loadings, Belief Items

Item	Factor Loading	
	Factor 1: Positive Outcome Expectancy Beliefs	Factor 2: Negative Outcome Expectancy Beliefs
PRE_Beliefs_1	<b>0.906</b>	
PRE_Beliefs_2	<b>0.888</b>	
PRE_Beliefs_3	<b>0.782</b>	
PRE_Beliefs_4	<b>0.571</b>	
PRE_Beliefs_7	<b>0.787</b>	
PRE_Beliefs_5		<b>0.862</b>
PRE_Beliefs_6		<b>0.903</b>



## Self-efficacy

Table 7: Exploratory Factor Analysis run on Self-efficacy Items

Total Variance Explained				
Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	6.6	55	55	5.69
2	1.777	14.807	69.807	4.824
3	0.827	6.89	76.697	
4	0.692	5.764	82.462	
5	0.41	3.415	85.877	
6	0.391	3.259	89.136	
7	0.362	3.014	92.15	
8	0.254	2.118	94.268	
9	0.247	2.059	96.327	
10	0.184	1.534	97.861	
11	0.135	1.121	98.983	
12	0.122	1.017	100	

Table 8: Factor Loadings, Attitude Items

Item	Factor Loading	
	Factor 1: General self-efficacy	Factor 2: Self-efficacy in context
PRE_Efficacy_WSI_1	<b>0.741</b>	
PRE_Efficacy_WSI_2	<b>0.435</b>	
PRE_Efficacy_WSI_3	<b>0.778</b>	
PRE_Efficacy_WSI_4	<b>0.932</b>	
PRE_Efficacy_WSI_5	<b>0.922</b>	
PRE_Efficacy_WSI_6	<b>0.875</b>	
PRE_Efficacy_WSI_14	<b>0.736</b>	
PRE_Efficacy_WS2_1		<b>0.881</b>
PRE_Efficacy_WS2_2		<b>0.93</b>
PRE_Efficacy_WS2_3		<b>0.836</b>
PRE_Efficacy_WS2_4		<b>0.861</b>
PRE_Efficacy_WS2_5	<b>0.392</b>	



## Collective Self-efficacy

Table 9: Exploratory Factor Analysis run on Collective Self-efficacy Items

Total Variance Explained			
Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	6.237	89.1	89.1
2	0.268	3.833	92.933
3	0.158	2.257	95.189
4	0.115	1.638	96.828
5	0.095	1.361	98.189
6	0.073	1.038	99.227
7	0.054	0.773	100



## Appendix 5: Additional Technical Data

### Attitudes

Table 10: Related Samples t-Tests for Attitude Constructs among Workshop Participants

	Pre-mean	Post-mean	t-value	df	p-value
Attitudes towards IB	5.89	6.05	2.173	94	.032
General attitudes	5.79	5.93	2.192	92	.031
Specific attitudes	6.11	6.23	1.767	95	.080*

\*Supported by non-parametric test (Wilcoxon T) because initial distribution did not meet parametric assumptions.  $Z = 1.66, p = .09$ .

Table 11: Wilcoxon T-Tests for Attitude Constructs among Non-Workshop Participants\*

	Pre-mean	Post-mean	Z-score	df	p-value
Attitudes towards IB	5.91	5.89	-0.255	58	0.799
General attitudes	5.78	5.89	-1.750	56	0.080
Specific attitudes	6.18	5.95	-1.659	58	0.097

\*Ran non-parametric test (Wilcoxon T) because initial distribution did not meet parametric assumptions.

Table 12: Repeated Measures ANOVA Testing Interaction Between Time and Workshop Participation – Attitudes towards IB

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Post vs. Pre	0.579	1	0.579	1.006	0.317
Time * Participation (Active vs Control)	Post vs. Pre	1.29	1	1.29	2.241	0.136
Error(time)	Post vs. Pre	87.483	152	0.576		



Table 13: Repeated Measures ANOVA Testing Interaction Between Time and Workshop Participation – General Attitudes

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Post vs. Pre	5.188	1	5.188	6.756	0.01
Time * Participation (Active vs Control)	Post vs. Pre	0.008	1	0.008	0.01	0.921
Error(time)	Post vs. Pre	113.636	148	0.768		

Table 14: Repeated Measures ANOVA Testing Interaction Between Time and Workshop Participation – Specific Attitudes

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Post vs. Pre	0.007	1	0.007	0.009	0.926
Time * Participation (Active vs Control)	Post vs. Pre	4.686	1	4.686	6.032	0.015
Error(time)	Post vs. Pre	118.862	153	0.777		



## Beliefs

Table 15: Related Samples *t*-Tests for Outcome Expectancy Beliefs among Workshop Participants

Expectancy beliefs	Pre-mean	Post-mean	<i>t</i> (or <i>Z</i> )-value	<i>df</i>	<i>p</i> -value
Positive beliefs	5.68	5.74	-0.017*	-	.986
Negative beliefs	3.50	4.12	3.330	96	.001

\* Non-parametric test (Wilcoxon T) because initial distribution did not meet parametric assumptions.

Table 16: Wilcoxon T-Tests for Outcome Expectancy Beliefs among Non-Workshop Participants

Expectancy beliefs	Pre-mean	Post-mean	<i>t</i> (or <i>Z</i> )-value	<i>df</i>	<i>p</i> -value
Positive beliefs	5.60	5.63	-1.058*	-	.290
Negative beliefs	3.56	3.51	0.238	58	.813

\* Non-parametric test (Wilcoxon T) because initial distribution did not meet parametric assumptions.

Table 17: Repeated Measures ANOVA Testing Interaction Between Time and Workshop Participation – Negative Outcome Expectancy Beliefs

Source	time	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Time	Post vs. Pre	8.475	1	8.475	5.338	0.022
Time * Participation (Active vs Control)	Post vs. Pre	6.128	1	6.128	3.86	0.051
Error(time)	Post vs. Pre	244.493	154	1.588		

## Self-efficacy

Table 18: Related Samples *t*-Tests for Self-efficacy Constructs among Workshop Participants

	Pre-mean	Post-mean	<i>t</i> -value	<i>df</i>	<i>p</i> -value
General self-efficacy	4.13	5.40	10.431	96	<.001*
Self-efficacy in context	4.70	5.50	6.296	96	<.001

\*Supported by non-parametric test (Wilcoxon T) because initial distribution did not meet parametric assumptions.  $Z = -7.50$ ,  $p = <.001$ .



Table 19: Related Samples *t*-Tests for Self-efficacy Constructs among Non-Workshop Participants\*

	Pre-mean	Post-mean	<i>t</i> -value	<i>df</i>	<i>p</i> -value
General self-efficacy	4.71	4.89	2.037	57	0.046*
Self-efficacy in context	4.90	5.03	0.717	58	0.476**

\*Supported by non-parametric test (Wilcoxon T) because initial distribution did not meet parametric assumptions.  $Z = 2.24$ ,  $p = .025$ .

\*\*Supported by non-parametric test (Wilcoxon T) because initial distribution did not meet parametric assumptions.  $Z = 1.439$ ,  $p = .150$ .

Table 20: Repeated Measures ANOVA Testing Interaction Between Time and Workshop Participation – General self-efficacy

Source	time	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Time	Post vs. Pre	37.841	1	37.841	71.211	<.001
Time * Participation (Active vs Control)	Post vs. Pre	21.268	1	21.268	40.022	<.001
Error(time)	Post vs. Pre	81.303	153	0.531		

Table 21: Repeated Measures ANOVA Testing Interaction Between Time and Workshop Participation – Self-efficacy in context

Source	time	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Sig.
Time	Post vs. Pre	15.588	1	15.588	19.166	<.001
Time * Participation (Active vs Control)	Post vs. Pre	8.384	1	8.384	10.309	0.002
Error(time)	Post vs. Pre	125.251	154	0.813		



### Collective Self-efficacy

Table 22: Related Samples *t*-Tests for Collective Self-efficacy Items

	Pre-mean	Post-mean	<i>t</i> -value	<i>df</i>	<i>p</i> -value
Active	4.70	5.10	2.96	96	.004
Control	4.44	4.48	0.278	58	.787

Table 23: Repeated Measures ANOVA Testing Interaction Between Time and Workshop Participation – Collective Self-efficacy

Source	time	Type III Sum of Squares	<i>df</i>	Mean Square	F	Sig.
Time	Post vs. Pre	2.382	1	2.382	3.059	0.082
Time * Participation (Active vs Control)	Post vs. Pre	3.517	1	3.517	4.516	0.035
Error(time)	Post vs. Pre	119.911	154	0.779		

### Overall change

Table 24: Related Samples *t*-Tests for Overall Change

	Pre-mean	Post-mean	<i>t</i> -value	<i>df</i>	<i>p</i> -value
Active	5.25	5.56	5.934	97	<.001
Control	5.30	5.30	0.271	58	.787



## Appendix 6: Additional Technical Data for Context and Mechanism Analyses

### Context

The influence of features were tested using a hierarchical multiple regression analysis in which overall PD score (PRE) was entered on the first step, and the context variables were entered on the second step. The effects of individual mechanisms (accounting for pre-PD outcomes) were explored, alongside their combined effect. The final model is presented below.

Table 25: Multiple Regression Results for Tests of Contextual Features

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.623	0.445		3.644	<.001
Overall PD score PRE	0.753	0.085	0.7	8.885	<.001
(Constant)	1.278	0.374		3.422	0.001
Overall PD score PRE	0.617	0.077	0.573	8.005	<.001
General collective self-efficacy	0.045	0.014	0.859	3.192	0.002
Norms	0.199	0.036	0.402	5.512	<.001
Leadership	-0.057	0.016	-0.947	-3.507	0.001

Table 26: R-Squared Change Regression Results for Tests of Contextual Features

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.700a	0.491	0.484	0.551	0.491	78.95	1	82	<.001
2	.816b	0.666	0.649	0.455	0.176	13.843	3	79	<.001

a Predictors: (Constant), Overall PD score PRE

b Predictors: (Constant), Overall PD score PRE, Norms, Pre Leadership



### Mechanisms – factor analysis

In the post-survey, participants were asked a series of eight items designed to capture their experience during and after attending the workshop. These eight items were intended to capture various ‘mechanisms’ that might contribute to (or inhibit) participant change. An exploratory factor analysis was conducted on these eight items suggesting these items represented three factors: (1) practice & feedback after the workshop, (2) reluctance about putting the workshop activities in practice, and (3) modelling & practice during the workshop. EFA results are presented in the tables below.

Table 27: Exploratory Factor Analysis run on Mechanism Items

Total Variance Explained				
Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	3.6	45.004	45.004	2.813
2	1.65	20.629	65.633	1.779
3	1.031	12.889	78.522	2.828
4	0.693	8.657	87.178	
5	0.453	5.663	92.841	
6	0.299	3.734	96.575	
7	0.178	2.219	98.794	
8	0.096	1.206	100	

Table 28: Factor Loadings, Mechanism Items

Item	Factor Loading		
	Factor 1: Practice & feedback - After	Factor 2: Reluctance	Factor 3: Practice & modelling - During
POST_Workshop_Exp_1			<b>0.816</b>
POST_Workshop_Exp_7			<b>0.821</b>
POST_Workshop_Exp_8	<b>0.712</b>		
POST_Workshop_Exp_9	<b>0.866</b>		
POST_Workshop_Exp_10	<b>0.921</b>		
POST_Workshop_Exp_11		<b>0.912</b>	
POST_Workshop_Exp_12		<b>0.865</b>	



### Mechanisms – regression results

Mechanisms were tested using a hierarchical multiple regression analysis in which overall PD score (PRE) was entered on the first step, and the two mechanisms (practice & feedback after workshop; and modeling & practice during workshop) were entered on the second step. The effects of individual mechanisms (accounting for pre PD outcomes) were explored, alongside their combined effect. The final models are presented below. Although factor 2 (reluctance) was tested it was not a predictor of post-survey outcomes; it is therefore not presented below.

Table 29: Multiple Regression Results for Tests of Mechanisms

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.665	0.437		3.81	<.001
Overall PD score PRE	0.742	0.083	0.694	8.944	<.001
(Constant)	1.463	0.421		3.476	0.001
Overall PD score PRE	0.588	0.086	0.55	6.801	<.001
Practice & feedback after workshop	0.095	0.037	0.208	2.536	0.013
Modelling & practice during workshop	0.107	0.051	0.172	2.096	0.039

Table 30: R-Squared Change Regression Results for Tests of Mechanisms

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.694a	0.482	0.476	0.54542	0.482	80.004	1	86	0
2	.751b	0.564	0.548	0.5065	0.082	7.862	2	84	0.001

a Predictors: (Constant), Overall PD score PRE

b Predictors: (Constant), Overall PD score PRE, Practice & feedback after workshop, Modelling & practice during workshop



### Workshop leader factors – regression results

Workshop leader factors were tested using a hierarchical multiple regression analysis in which overall PD score (PRE) was entered on the first step, and the five workshop leader factors (attitudes towards the IB, attitudes towards the workshop, self-efficacy with respect to workshop delivery, self-reported practice, and views on training quality) were entered on the second step. The final (non-significant) model is presented below.

Table 31: Multiple Regression Results for Test of Workshop Leader Factors

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.167	0.843		1.384	0.179
Overall PD Score (PRE)	0.837	0.161	0.722	5.215	<.001
2 (Constant)	0.811	5.507		0.147	0.884
Overall PD Score (PRE)	0.711	0.169	0.613	4.218	<.001
Attitudes to IB	1.116	1.166	0.275	0.957	0.350
Attitudes to workshop	-0.432	0.905	-0.304	-0.477	0.638
Self-efficacy	0.466	0.63	0.546	0.74	0.468
Self-reported practice	-1.182	0.966	-0.522	-1.224	0.235
Views on training quality	0.12	0.344	0.154	0.348	0.732