

# Meanings and Practices of Inquiry-Based Teaching and Learning in the International Baccalaureate

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## Executive Summary

International Baccalaureate (IB) centers **inquiry** in its mission statement and seeks to develop learners who are inquirers. Therefore, the role, place, and efficacy of **inquiry-based teaching and learning (ITL)** is of vital importance to the organization's identity and success. ITL has a long and sometimes contested history in education; it encompasses a range of approaches to instruction that are driven by the curiosities and questions of student learners within supportive learning environments. The IB approach has sought to integrate inquiry into all levels of schooling and across subject matters, making IB schools an outstanding testbed for clarifying what ITL can and should mean, how it is implemented across a range of contexts, and what impact participation in inquiry learning activity may have on student learners. **This report is a study of the meanings and practices of ITL in a sample of schools, by describing the IB approach to and implementation of ITL.**

The study involved schools, educators, and students engaged in the IB Primary Years Programme<sup>1</sup> (PYP), Middle Years Programme (MYP), and Diploma Programme (DP). The following research questions guided the study:

- What theory of change regarding ITL operates within the IB ecosystem<sup>2</sup>, at the organizational, school, and classroom levels?
- What does ITL mean to key IB stakeholders, and how does it vary across the IB continuum?
- How do educators learn about ITL practices?

## Method

We conducted this study of ITL through an iterative process. Our initial work involved three components of theory-building and analysis: an academic literature review, interviews with key personnel in organizational leadership positions, and analysis of important IB documents. The product of this work was a preliminary theory of change, which described the strategies and actions that may lead to particular outcomes within an intentional, mission-driven organizational context, which may subsequently lead to further outcomes, and to eventual broad impacts. In this study, we produced a theory of change describing the organizational level of activity, which includes strategies and outcomes that stakeholders and publications of the IB Organization (IBO) and engage in, and a theory of change at the instructional level, including the strategies and outcomes that stakeholders described occurring in classrooms implementing ITL.

After that initial work, we refined and enhanced our initial findings by examining perspectives and practices of ITL in a selection of eight schools across the IB programmatic continuum and in two IB regions (Africa, Europe, and the Middle East and the Americas), based on a qualitative analysis of 9 focus group interviews and 13 individual interviews of a total of 46 IB educators. Thus, the final product of this study is a refined organizational and instructional theory of

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<sup>1</sup> In this report, we use standard American English. However, when referencing specific IB programs, we use “programme” (e.g., Primary Years Programme).

<sup>2</sup> Throughout this report, we use the phrase “IB ecosystem” to refer to the informal network of all schools and people engaged in IB education. Where we mean the formal IB Educator Network (IBEN), we use that term or acronym.

change for ITL, along with a rich description of what IB stakeholders mean by ITL, how ITL varies across the continuum, and how teachers learn about ITL practices.

We designed an additional aspect of this study to provide insight into the efficacy of IB instruction at producing expected and valuable *student-level* outcomes of inquiry-based instruction, through a pre-/post- survey design. However, due to the COVID-19 pandemic, we adjusted this aspect of the study to be more exploratory, and share descriptive results and recommendations for future research in Appendix A.

## Main Findings

The Organizational<sup>3</sup> Theory of Change (see top of Figure 1; this image also appears as full page in Appendix B) articulates two key strategies that we found institutions participating in the IBO to be pursuing: 1) provide resources to clarify and support key principles of the organization; and 2) build a mutually supportive ecosystem by engaging educators who enact and share practices of ITL. These two strategies lead to a series of interim outcomes. Providing resources leads to: the organization articulating what is **fixed** and **flexible**, focusing deliberately on what it stands for, building upon their own successes, and schools and educators addressing their own contexts while engaging in continuous improvement processes. The mutually supportive ecosystem refers to educators and schools supporting one another, and leads to a growing number of educators and schools becoming aware of a range and richness of promising practices, creating a collaborative culture where schools learn from each other, educators and schools enacting principled adaptation, creating learning environments that align with research-based knowledge about how people learn, and teachers pursuing their own inquiries, innovating, and continuously improving.

If the Organizational Theory of Change operates successfully, its outcome is that teachers are able to facilitate students participating in well-designed disciplinary and interdisciplinary inquiry-based instruction. We show what that looks like in terms of classroom actions in the bottom half of Figure 1 (i.e., the Instructional Theory of Change, which also appears as full page in Appendix C). How well-designed and well-facilitated classroom inquiry is depends on teacher actions (shown in the at the top left of the middle section) and student actions (shown in the yellow at the bottom left of the middle section); the arrows between students and teachers reinforce that the ideal occurs when students and teachers work together in a productive community of learners. The actions and conditions described above enable students to participate in well-designed and well-facilitated disciplinary and transdisciplinary ITL that results in a number of interim outcomes:

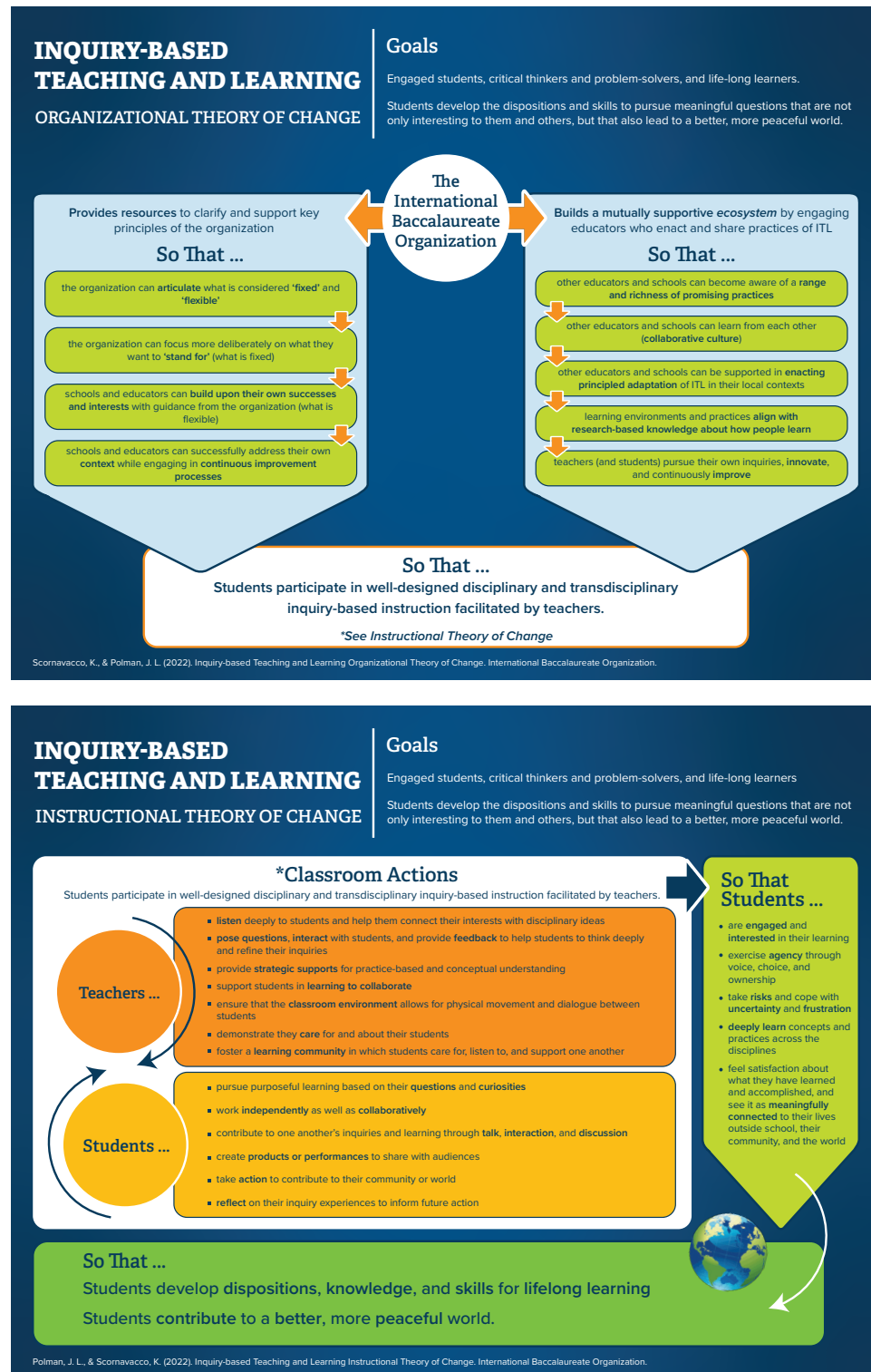
- engagement/interest,
- agency,
- risks, uncertainty and frustration,
- deep conceptual learning, and
- meaningful connection/life relevance.

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<sup>3</sup> We stress that the word “organizational” when referring to this theory of change does not refer to the IB Organization. IBO has not in any fashion officially adopted this theory of change. Rather, the theory of change is an outcome of the present study, and includes a set of conjectures for the organizational level of activity with respect to ITL, based on our data analysis and interpretation.

All these interim outcomes lead to students developing dispositions, knowledge, and skills for lifelong learning. Ultimately, the impact is students who contribute to a better, more peaceful world.

**Figure 1**  
Organizational (top) and Instructional (bottom) Theory of Change





The fact that IB documents and institutional representatives (at the IBO and participating school levels) expect PYP teachers to develop curricula framed as a transdisciplinary program of inquiry, and facilitate their students through six cycles of inquiry per year, related to six designated transdisciplinary themes, means that inquiry is pervasively present and forefronted in the PYP. Inquiry is strongly present in the MYP, as well, through the programmatic element of the Personal Project. In the DP, the fact that the emphasis is on disciplinary courses to prepare students for particular disciplinary content to be covered on high-stakes exams limits the degree to which student-driven inquiry drives instruction.

There is alignment of salient ITL concepts in IBO-produced overview documents that speak across all the IB programmes, and these generally align with evidence-informed practices. There are some differences in ways that the programme-specific documents speak to student inquiry, which warrant further investigation—relating to collaboration, disciplines/disciplinary learning, and criticality and their connections to ITL.

Educators across the IB ecosystem and schools studied across the continuum generally ascribe meaning to ITL in agreement with the Organizational and Instructional Theories of Change put forth in this study. Figure 2 shows key meanings our study participants noted with regard to benefits of ITL, important tradeoffs, constraints, and factors that facilitate ITL.

**Figure 2**  
Meanings Teachers and Leaders Ascribe to ITL

| Benefits                     | Important Tradeoffs  | Constraints  | Facilitators   |
|------------------------------|--|--|--|
| Engagement                   | Breadth vs. depth  | Time   | Various means of creating and sustaining cultures—such as the items shown in the Organizational Theory of Change (Figure 1, top) |
| Well-being                   | Prepping for standardized tests vs. pursuing student interests and emergent learning opportunities | Standards  |  |
| Accessibility                |  | Outdated notions that conceptual content learning of the basics must precede inquiry |  |
| Agency                       |  |  |  |
| Confidence                   |  |  |  |
| Relevance                    |  |  |  |
| Critical thinking            |  |  |  |
| Deeper learning              |  |  |  |
| Greater retention            |  |  |  |
| Developing lifelong learners |  |  |  |

IB educators<sup>4</sup> learn about and use ITL practices through a variety of means:

- engaging in a collaborative culture within the IB ecosystem,
- committing to clear visions of ITL,
- referring to and relying on resources that clarify and support key principles of ITL, and
- participating in learning opportunities that often vary by programme.

<sup>4</sup> We use the term “IB educators” throughout this report to refer to **all** education professionals working in IB schools and in the IBO. Although the IB Educator Network (IBEN) certifies specific individuals as “IB educators,” we use the term more broadly.

## Recommendations & Policy Considerations

We note recommendations based on this study briefly here and elaborate on them in the main narrative (see pp. 37-39). The IBO and its stakeholders should continue to seek ways to assist teachers in becoming more well-informed and effective at ITL. The theories of change provide a roadmap to implementing ITL, and they may supplement the use of existing IB documents with a strong ITL focus, along with book studies, lesson study, and other professional development initiatives.

In future iterations of IB-published documents, we recommend that more explicit attention be given to integrating ITL strategies, especially in the MYP and DP (see pp. 19-21 and p. 38). Relatedly, we recommend that IB stipulate discipline-specific inquiry learning goals and particular disciplinary practices that are worth stressing in documents such as subject guides (see pp. 33-35 and p. 38). Further, IBO-sponsored publications, IB Educator Network (IBEN)-sponsored events and conferences, and locally organized professional learning community activities should openly address the tensions and tradeoffs of time, coverage, and external examination preparation in the DP.

Based on findings in the DP (see p. 27 and pp. 38-39), we also recommend that IBO leaders, as well as school-level leaders in the IB ecosystem, continue to discuss and consider policy and practices that address tensions that arise between an inquiry approach and standardized tests that require students to recount factual information. IBO could consider continuing DP exam adjustments made during the COVID-19 pandemic. The organization and school leaders could aim to place more focus on portfolio-based external and Internal Assessments (IAs) based on extended inquiry work done within courses and less written external exams not integrated with classroom-based inquiry (see pp. 39).

Two considerations for future research leading to new publications are put forth. The first is a future literature review and/or study on, ‘How can teachers facilitate students developing good inquiry questions?’ (see pp. 16-17, 25-26, 39). The second is research building on the Organizational and Instructional Theories of Change: a key finding of this study. A future study could test the hypothesized relations between classroom actions in the Instructional Theory of Change and the outcomes of engagement/interest; agency; risks, uncertainty and frustration; meaningful connection/life relevance; deep conceptual learning; and the posited relation of all of these to dispositions and skills for lifelong learning (see p. 39). It could be valuable to conduct a mixed methods study of qualitative cases of PYPs, MYPs, and DPs, along with quantitative studies using reliable assessment measures for the outcome constructs. In addition, a similar or parallel organizational and teacher learning study could be conducted based on the Organizational Theory of Change.

## Concluding Statement

ITL is already an important component of the success of IB. IB educators have a strong sense of what ITL can and should mean, and how to put it into practice, thanks to an effective set of resources and a supportive ecosystem. There are ample opportunities for creating a more thriving educational ecosystem, which will benefit students and teachers while contributing to a more flourishing planet.



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## List of Acronyms/Abbreviations

**CAS:** Creativity, Activity, Service

**DP:** Diploma Programme

**EE:** Extended Essay

**IB:** International Baccalaureate

**IBEN:** IB Educators Network

**IBO:** International Baccalaureate Organization

**ITL:** inquiry-based teaching and learning

**K-12:** kindergarten through 12th grade, spanning approximately ages 6-18 years

**MYP:** Middle Years Programme

**NRC:** National Research Council

**PD:** professional development

**PYP:** Primary Years Programme

**TIMSS:** Trends in International Mathematics and Science Study

**TOK:** Theory of Knowledge

**UbD:** Understanding by Design (Wiggins and McTighe, 1998; 2005), a curriculum design approach based on backwards design

## Introduction

International Baccalaureate (IB) was founded in 1968 and currently includes more than 5,500 schools in 159 countries worldwide. IB offers four educational programmes to more than 1.95 million students aged 3 to 19 years across the globe. A portion of IB's mission is "to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect." IB has formulated its "mission statement in action" (IBO, 2013b, 0:01) through a learner profile, which states that IB programmes aim to develop learners who are: Inquirers, Knowledgeable, Thinkers, Communicators, Principled, Open-minded, Caring, Risk-takers, Balanced, and Reflective.

Through its centering in the mission statement and learner profile, **inquiry** is a key construct for IB. Therefore, the role, place, and efficacy of inquiry-based teaching and learning (ITL) is of vital importance to the organization's identity and success. ITL has a long and sometimes contested history in education; it encompasses a range of approaches to instruction that are driven by the curiosities and questions of student learners within supportive learning environments. The IB approach has sought to integrate inquiry into all levels of schooling and across subject matters, making IB schools an outstanding testbed for clarifying what ITL can and should mean, how it is implemented across a range of contexts, and what impact participation in inquiry learning activity may have on student learners. This report describes a study of the IB approach to, implementation of, and indicators of efficacy of ITL.

This study addressed the following research questions:

- What theory of change regarding ITL operates within the IB ecosystem, at the organizational, school, and classroom levels?
- What does ITL mean to key IB stakeholders and how does it vary across the IB continuum?
- How do educators learn about ITL practices?

An exploratory part of the study addressing student mindset is included in Appendix A.

This study examines schools, educators, and students engaged in the IB Primary Years Programme (PYP), Middle Years Programme (MYP), and Diploma Programme (DP). The fourth and newest IB programme, the Career-related Programme, is not examined here. The DP was IB's first programme and includes young adults aged 16-19 years; its curriculum is made up of six subject groups and the DP core, comprising Theory of Knowledge (TOK); Creativity, Activity, Service (CAS); and an Extended Essay (EE). IB established the MYP in 1994 for children aged 11-16 years with a curricular framework focused on six so-called needs: global, intellectual, personal, physical, creative, and social. IB established the PYP in 1997 for children aged 3-12 with a curricular framework based around six transdisciplinary themes: who we are, where we are in place and time, how we express ourselves, how the world works, how we organize ourselves, and sharing the planet.

The remainder of this report is organized as follows: a review of the academic literature, our study's method, findings, recommendations, references, and appendices.



## Review of Academic Literature

The literature we refer to in this document was identified as follows. First, we built on the knowledge and scholarship of the authors (e.g., Boardman et al., 2021; O'Neill & Polman, 2004; Polman, 2000, 2004, 2006a, 2006b; Polman & Miller, 2010; Polman et al., 2014; Polman et al., 2018; Polman et al., 2021; Scornavacco et al., 2021) in the theoretical and empirical research on ITL and related active learning approaches to instruction, with a particular focus on the ideas referred to in the initial interviews (described below). In addition, we used Google Scholar to get a sense of the landscape of publications on ITL. This was a broad-strokes step to identify literature to delve into, and though the search engine has some limitations, as well as strengths,<sup>5</sup> we felt confident that it could at least provide a sense of what has been written about ITL. We were also interested in the range of understandings of ITL across content areas/disciplines, as well as general, public attention to inquiry within or about the IBO. In Table 1, we provide a tally of publications, sorted by search terms and content areas/disciplines. Overall, there is substantially more written about inquiry in the science disciplines, including when using the search term, “International Baccalaureate”<sup>6</sup>. In addition, the search term “inquiry-based *learning*” yields substantially more articles than “inquiry-based *teaching*”, reinforcing our own speculation that more attention has historically been paid in scholarly literature to the ideals and student experiences of ITL than to the actual day-to-day teaching or support for it. Nonetheless, especially in recent years, scholars are focusing much more on teaching, with ample publications referring specifically to the teacher’s role in fostering student inquiry (e.g., Dobber et al., 2017; Grossman et al., 2019; and others cited in the literature review).

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<sup>5</sup> For instance, relative to more tightly curated, specialized databases such as Clarivate Analytics Web of Science, or PubMed, Google Scholar returns more “gray literature.” On the positive side, this means that Google Scholar returns more relevant scholarship. On the negative side, a higher proportion of that scholarship is lower quality, because it is not peer-reviewed (Schultz, 2007).

<sup>6</sup> As an initial, broad-strokes search on public scholarship of ITL, this search suggested that there is indeed interest in the topic of inquiry within the IB ecosystem.

**Table 1**

Search Results Using Google Scholar

| Term                                       | # Citations | # Citations Since 2010 | # Citations since 2010 by Discipline |
|--|-------------|------------------------|--------------------------------------|
| Unit of Inquiry                            | 2,050       | 1,310                  | Science: 1,150                       |
|  |             |                        | History: 860                         |
|  |             |                        | Social Studies: 206                  |
|  |             |                        | Language Arts: 108                   |
|  |             |                        | English*: 599                        |
|  |             |                        | Math: 361                            |
| Inquiry Based Teaching and Learning (ITL)  | 3,010       | 2,210                  | Science: 2,100                       |
|  |             |                        | History: 1,530                       |
|  |             |                        | Social Studies: 405                  |
|  |             |                        | Language Arts: 256                   |
|  |             |                        | English*: 989                        |
|  |             |                        | Math: 713                            |
| Inquiry-Based Teaching                     | 19,500      | 14,300                 | Science: 13,300                      |
|  |             |                        | History: 6,570                       |
|  |             |                        | Social Studies: 2,030                |
|  |             |                        | Language Arts: 1,410                 |
|  |             |                        | English*: 5,989                      |
|  |             |                        | Math: 5,140                          |
| Inquiry-Based Learning                     | 53,600      | 17,800                 | Science: 18,900                      |
|  |             |                        | History: 16,500                      |
|  |             |                        | Social Studies: 6,670                |
|  |             |                        | Language Arts: 4,380                 |
|  |             |                        | English*: 16,000                     |
|  |             |                        | Math: 13,100                         |
| “International Baccalaureate” (IB) Inquiry | 15,000      | 11,700                 | Science: 13,800                      |
|  |             |                        | History: 11,600                      |
|  |             |                        | Social Studies: 5,120                |
|  |             |                        | Language Arts: 3,900                 |
|  |             |                        | English*: 12,100                     |
|  |             |                        | Math: 7,890                          |

\* These numbers of citations for “English” may refer to publications written in/about the English language, not necessarily the subject/discipline of English



We first describe **why** student inquiry is supported in the literature. ITL relates strongly to other child-centered pedagogies, especially project-based learning (HQPBL, 2018; Polman, 2000; Scott et al., 2018) and problem-based learning (Barron et al., 1998; Hmelo-Silver, 2004) and other approaches premised on engaging youth in authentic practices (e.g., O'Neill & Polman, 2004; Polman et al., 2014). There is a long tradition of ITL that arguably spans centuries, with recognizable ties in the most recent two centuries to work from Rousseau and Dewey on connecting schooling to interest (e.g., 1964c) and experience (e.g., 1938). Research in the learning sciences over the past 60 years has reinforced and refined our understanding of why ITL makes sense, and how ITL can be successful (e.g., Baines et al., 2015; National Research Council [NRC], 2000a, NASEM, 2018). For instance, theory and research has shown how knowledge is situated (e.g., Brown et al., 1989; Lave & Wenger, 1991), deeply cultural (NASEM, 2018; Nasir et al., 2006), and how knowledge and action are tied to social interaction in and identification with communities of practice (Polman & Miller, 2010; Wenger, 1998). Productive communities of learners are places where “learning occurs as people participate in shared endeavors with others, with all playing active but often asymmetrical roles” (Rogoff, 1994, p. 209) rather than one-sided transmission-based instruction.

***A fundamental insight that has driven child-centered educational approaches is that the mind is active and imposes meaning and structure on experience.***

A fundamental insight that has driven child-centered educational approaches is that the mind is active and imposes meaning and structure on experience. In two works influential on education from the 1760s—Julie and Emile—Jean-Jacques Rousseau stressed the importance of starting with the child’s own experiences and dispositions and building on them, rather than imposing ideas that are relevant only from the perspective of the adult or society (Archer, 1964). Building on children’s natural dispositions implies that all students cannot be treated the same. Instead, teachers must work to diagnose and cultivate those dispositions. Learning must also build from the child’s personal experience: instead of learning geography from maps of distant locations, a child such as Rousseau’s Emile is better served by studying his own area and constructing his own map (cited in Farnham-Diggory, 1990). Dewey’s philosophy that “learning is active ... it involves reaching out of the mind” (Dewey, 1964c, p. 343) has much affinity with Rousseau. Both Rousseau and Dewey stressed the importance of children’s interests. Dewey noted that genuine interest linked to both the means and ends of the task at hand fosters true learning, whereas “sugar-coating” of tasks with extrinsic rewards fosters simply the appearance of attention (Dewey, 1964a, p. 263). Teachers also need to diagnose interests as indicative of children’s development and readiness to learn (Dewey, 1964b).

With the above brief backdrop on why inquiry is recommended, we turn to more closely examining **what** the meaning of inquiry is. ITL encompasses a range of approaches to instruction that are driven by the curiosities and questions of student learners within supportive learning environments. As with any buzzword in education, what scholars mean by inquiry varies widely (Polman, 2006a). Audet (2005b) provided a useful definition when he wrote that “inquiry is any activity aimed at extracting meaning from experience” (p. 6), and that inquiry can be described as a continuum of ideas, issues, and practices. He and other authors (e.g., Furtak & Penuel, 2019) have pointed out that although the term inquiry is associated with

hands-on activities in many educators' minds, many hands-on activities are not necessarily genuine inquiry. Genuine inquiry requires that learners themselves are driving their own sense-making.

Across all school disciplines and levels, scholars conducting applied research and practitioners have identified and refined several key features of effective ITL. Inquiry is typically characterized as occurring in **cycles** that include asking an answerable question or identifying a researchable problem; developing a plan and taking some form of action; gathering resources, analyzing and summarizing information; drawing conclusions and reporting findings; and reflecting on the process (Audet, 2005b, p. 14; Pedaste et al., 2015). The various phases of inquiry are characterized as involving a good deal of **iteration** (Grossman et al., 2019; Polman, 2000; Stamatis & Boardman, 2021) of students' ideas and interim products. **Questions** and the **curiosities** that underly them are universally seen as fundamental to ITL (Bruner, 1961; Murdoch, 2015; Polman, 2000; Wells, 1999). Students are encouraged to and supported in carrying out inquiries which are **authentic** to themselves and to others, and which use the authentic tools of disciplines (Duke et al., 2021; Grossman et al., 2019; Polman, 2012; Polman et al., 2021; Polman et al., 2018). Thus, they have **agency and purpose** in pursuing inquiry aimed toward meaningful action, and often connected to the identities they currently hold and are developing (Boaler & Greeno, 2000; Calabrese Barton & Tan, 2010; Scardamalia & Bereiter, 1991; Verhoeven et al., 2021). Student inquiry is also **collaborative** rather than carried out by isolated individuals (Baines et al., 2015; Boardman & Trepper, 2021; Grossman et al., 2019; HQPBL, 2018).

Research over the past few decades has contributed to our understanding of what **inquiry in the disciplines** is and should look like. In this section, we briefly summarize research in the sciences, history, mathematics, and language arts (including literature), as well as research on transdisciplinary learning.

Interest in the role of inquiry in science education burgeoned globally in the 1990s and continued into the 21<sup>st</sup> century. For instance, the U.S. NRC developed a consensus report in 1996 that focused on the importance of students learning to do inquiry in **the sciences**, and a special issue of the journal *Science Education* in 2004 noted that focus on inquiry in science education was a global phenomenon, with scholars describing its importance in Lebanon, Israel, Venezuela, Australia, and Taiwan (Abd-El-Khalick et al., 2004). Inquiry was also an aspect of reforms in the United Kingdom (Millar & Osborne, 1998), and was assessed in the Trends in International Mathematics and Science Study (TIMSS; Martin et al., 2000). The NRC definition of inquiry represents this international trend:

*Scientific inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. Inquiry also refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world. (NRC, 1996, p. 23)*

As summarized in that consensus report and an accompanying volume specifically focused on science inquiry (see NRC, 2000b), the inquiry that scientists do, and the sort of inquiry that school-based educators in science were expected to facilitate students doing, should include identifying questions and concepts that guide scientific investigations, designing and conducting scientific investigations, formulating and revising scientific explanations and

models using logic and evidence, recognizing and analyzing alternative explanations and models, and communicating and defending a scientific argument (NRC, 1996, 2000b). A good deal of research on how to support effective inquiry in the sciences has been conducted in the international community since—see, for example, Valente et al. (2011), for European work, and Ramnarain (2018) for East Asian studies. This research often focused on how teachers structured and guided inquiry-based science instruction beginning with students' questions (e.g., Krajcik & Blumenfeld, 2006; Polman, 2000). Furtak and colleagues (2012) carried out an important meta-analysis, finding that the degree and kind of teacher support of inquiry was key (see pp. 18-19 for a general discussion of this issue). This body of research in science education and the learning sciences began to focus more and more closely on the epistemic *practices* of science, which informed the internationally influential *Framework for K-12 Science Education* (NRC, 2012). Both these consensus reports, and a large amount of empirical research in science education, emphasize how conceptual learning and learning of disciplinary practices of sciences should be done *together*, not separately. In other words, the consensus report authors recommend against teaching content in some lessons, and in other lessons processes or practices such as designing and carrying out investigations, doing data analysis, and building models and explanations.

A similar emergence of a focus on inquiry in **history and social studies** occurred in the 1990s, as well, and has continued. Based on a good deal of research on “historical thinking” (e.g., Holt, 1990; Wineburg, 1991), history scholars and educators in multiple countries including the United States (National Center for History in the Schools, 1994) and Canada (e.g., Seixas, 2006) developed standards for K-12 instruction. As in science education, the basic premise in history education is that young people will benefit by participating in and learning the practices of inquiry that are like those which professional historians use, but developmentally adjusted for youth and more strongly supported by teachers through guided inquiry. The kinds of practices that history educators stress in their discipline include contextualizing, inferring and interpreting, and corroborating (Hicks et al., 2004; Wineburg, 1991). Student-driven inquiry projects in history are frequently aimed toward creating warranted narrative accounts or museum exhibits from various sources and records of events that interpret history based on an understanding of historical context (Bain, 2005; Barton & Levstik, 2004; Levstik & Barton, 2001, Polman, 2006b; Reisman, 2012). In recent years, scholarly work has continued to focus on historical thinking practices that include student-driven inquiry. For instance, the C3 Framework for Social Studies State Standards (National Council for Social Studies, 2013) calls for reasoning and discourse, framing social studies as inquiry where students ask questions, employ disciplinary reasoning, analyze evidence, and communicate conclusions. In a review, Monte-Sano and Reisman (2016) described the importance of inquiry-based history and social studies instruction, and argued that more empirical studies in the field needs to focus on combining research on how students learn to do procedural practices and skills of disciplinary historical thinking, with research on how students' lived experiences shape understanding and interpretation of the past.

**Mathematics** has long focused on problem-solving, and mathematics educators have stressed the importance of moving away from a focus on decontextualized rote procedures to engaging students in mathematical sense-making (Boaler, 2002) and discourse (Lampert, 1990) in order to solve complex problems (e.g., Barron et al., 1998; Cognition and Technology Group at Vanderbilt, 1992). As noted by Tsankova and Dobynina (2005), the waves of so-called new math in the past few decades have been motivated by an effort to engage learners as inquirers, investigators and sense-makers, with teachers' role to motivate students and foster curiosity



through coaching and enabling students to participate in rich mathematical discussion to solve problems that are authentic and meaningful. This means that students need to be involved in problem-posing—formulating the interesting and worthwhile mathematical problems—and not just problem-solving (Cai et al., 2015).

In **literature and language arts**, inquiry is associated with instruction in analyzing literature, as well as student-driven writing and composing, which are also part of instructional expectations in contemporary standards documents such as the U.S. Common Core (National Governors Association, 2010). Literary analysis is a form of inquiry carried out extensively in K-12 education, with promising practices involving true dialogue (Bakhtin, 1986) between teachers and students, where classroom learning communities inquire, for instance, into the human condition as revealed in literature (Townsend, 2005). In addition, research has shown that language arts teachers can help students build on everyday practices, such as the way they argue and persuade in everyday life, to analyze literature that at first might seem distant from their experience with Shakespeare as an example (Lee, 2001). In addition, scholars (e.g., Dalton, 2020; Townsend, 2005) frequently recommend inquiry that leads to students' creative textual and multimodal expression and composition. For instance, Beach and Myers (2001) developed a prominent approach toward "Inquiry-based English Instruction", which integrated reading and composition in extended inquiries that are personally and culturally relevant. In this work, Beach and Myers demonstrated ways of engaging students in critical inquiry projects about the social worlds they inhabit or about those portrayed in literature and media. They showed how students can use various literacy tools (language, genres, narratives, signs, multimedia, and drama) to study, represent, critique, and transform these worlds. By engaging in these projects, students can learn to understand how these literacy tools are used to construct social worlds. More recent examples that frame their approach as project-based inquiry stress the power of inquiry, which is authentic to students in terms of interests and their identities, authentic to others in terms of addressing a real audience, and using contemporary authentic tools of design and genres of expression (Boardman et al., 2021; Polman et al., 2018).

As in other aspects of learning, how students learn and how teachers teach *within* individual disciplines has been the focus of much educational research. But particularly in the realm of ITL and project-based teaching and learning, there is a long thread recommending **multidisciplinary**, **interdisciplinary** and more recently **transdisciplinary** approaches (Audet, 2005a; Herrenkohl & Polman, 2018) rather than forcing inquiry strictly into disciplinary silos. These terms have been distinguished as follows: multidisciplinary work involves using different disciplinary tools side by side without integration; interdisciplinary work involves knowledge integration and synthesis and methods from different disciplines; and transdisciplinary work creates unified frameworks transcending disciplinary perspectives (Stember, 1991). Initiatives that move beyond disciplinary silos can be powerful not only because students are eager to make comparisons across school subjects they experience in a school day (Stevens et al., 2005), but also because solving problems in the real world often involves combining tools and approaches that come from multiple disciplines. Two examples of evidence-based curricula that span the literacy and social studies boundaries are "Read. Inquire. Write." (<http://readinginquirewrite.umich.edu/>), which involves cycles of argument writing, interpretation, critique, and counterargument; and Project PLACE, which focuses on literacy and civic engagement in early elementary school (Duke et al., 2016; Duke et al., 2021). Herrenkohl and Cornelius (2013) showed how ITL can be productive for elementary students to construct arguments in scientific and historical contexts, and to compare strong arguments in each field. An emerging area for disciplinary boundary spanning is the inter- and

transdisciplinary data science work that bridges science, mathematics, and graphic design (Rubin, 2020; Wilkerson & Polman, 2020; Wise, 2020).

Now, we turn to a review of what is known about **how teachers can effectively support student inquiry**. Hofstadter (1963) argued that the importance of interest in Dewey's theory of education led to serious mistakes on the part of later progressives, and the issue of how teachers can support student-centered and student-interest-driven instruction, while covering a pre-designated curriculum linger today. Dewey's own work (e.g., 1964c) stressed that the developing interests of children should continuously interact with the direction they get from adults. But the stress placed on the importance of students' interests led some progressives to become overly influenced by student whim. Dewey criticized later progressives for proceeding "as if any form of direction and guidance by adults were an invasion of individual freedom" (Dewey, 1938, p. 9). Kirschner and colleagues (2006) are among the most recent and prominent learning sciences education researchers to sound an alarm about the need for teachers to provide explicit instruction and guidance, with their recommendation ultimately being against inquiry-based and project-based approaches. But most scholars in the field believe abandoning inquiry is not the appropriate response; instead, most scholars argue for ensuring that inquiry is more effectively guided and purposeful. Therefore, a great deal of research over the past few decades has focused on how to move away from *unguided* or discovery learning to *effectively guided and scaffolded* inquiry (e.g., Barron et al., 1998; Dobber et al., 2017; Furtak et al., 2012; Hmelo-Silver et al., 2007; Polman, 2000, 2004; Polman & Pea, 2001; Tabak & Baumgartner, 2004; see p. 27 for the sorts of scaffolds found in this study of IB ITL practices). In their meta-analysis, Furtak et al. (2012) provided a useful framework for distinguishing enactments of inquiry-based instruction in science, which can be applied across disciplines. Dimensions they paid attention to included the cognitive dimension—which includes the *conceptual* knowledge domain; the *epistemic* domain of evidence, explanation, and interpretation; the *social* domain of collaborative and communicative processes; and the *procedural* domain focused on execution of procedures such as data analysis and representation. In addition, they described a guidance dimension of inquiry, which consists of a continuum from extremes of "teacher-led" instruction to "student-led inquiry" (i.e., discovery), with "teacher-guided inquiry" in the middle. In their meta-analysis, Furtak et al. (2012) found that engaging students in *teacher-guided* inquiry contexts does lead to learning gains (particularly in the epistemic domain of inquiry, and the combination of the procedural, epistemic, and social domains) when contrasted with comparison groups featuring traditional teacher-led lessons or unstructured student-led activities. They found that teachers were most effective when they were still active leaders of instruction, while guiding students in inquiry that was meaningful to them.

Features of teacher work that contribute to effective guidance in inquiry can be divided into the realm of planning effective **structures** and enacting effective **day-to-day coaching**. In terms of planning their curriculum, Wiggins and McTighe's (1998; 2005) *Understanding by Design (UbD)* backwards-design approach to inquiry-oriented curriculum design is widely accepted as an important and effective model. In *UbD* and other backwards-design models, essential questions that students and teachers find interesting and meaningful drive and unify teachers' unit and lesson planning. To the extent that teachers are successful at engaging students in the essential questions that are meant to drive UbD units, those students will participate in inquiry that is genuine to them. In addition, some research on the question of the importance of *depth* vs. *breadth* of science instruction is germane to promising practices in how teachers plan their curriculum and instruction. Schwartz and colleagues (2009) found that students who reported covering at least one major topic in depth, for a month or longer, in high school science were

found to earn higher grades in college science than did students who reported no coverage in depth. Students reporting breadth in their high school course, covering all major topics, did not appear to have any advantage in chemistry or physics and a considerable disadvantage in biology. This evidence implies that students can benefit from teachers making time in their plans for extended student inquiry in science. Based on other empirical findings in science (Furtak & Ruiz-Primo, 2008; Polman, 2004), language arts (Beach & Myers, 2001), and history (Reisman, 2012), scholars also recommend that teachers structure extended inquiry with interim milestone artifacts that provide opportunities for students to reveal their thinking and teachers to offer formative assessment and guidance.

At the level of day-to-day coaching and guidance, research has shown that **fostering dialogue** with students supports inquiry learning (e.g., Wells, 1999). In particular, students more productively engage in inquiry when teachers act as “partners” (Tabak & Baumgartner, 2004, p. 393) co-inquiring alongside students to the extent possible, while occasionally pulling back to play more of a “mentor” role (ibid, p. 403). To provide effective guidance, teachers can seek to connect students’ incoming ideas, practices, and understandings to more sophisticated ideas and practices that the teacher knows are targets in the discipline (e.g., Lee, 2001; Polman & Pea, 2001). Dobber et al. (2017) found that teachers were better able to support inquiry instruction by implementing strategies in **metacognitive regulation** such as focusing on thinking skills, developing a culture of inquiry, and supporting inquiry discourse; they supported students’ **conceptual regulation** by providing information on the research topic and focusing on conceptual understanding; and they supported students’ **social regulation** by bridging gaps between high and low achievers, organizing student learning in groups, and focusing on collaboration processes.

The academic literature on ITL is extensive and deep, but we hope the above summary provides a set of guideposts for key themes and citations to possible future reading. We used the themes in this literature review to inform our studies of IB documents and practices, which we turn to next, and to inform our ultimate recommendations.

## Method

We conducted this study iteratively. In the initial period, we aimed to develop a shared understanding of ITL within the IB ecosystem, which we represent as a theory of change. Then we sought to summarize meanings and practices of ITL in a selection of 8 schools in 2 IB regions (Africa, Europe, and the Middle East and the Americas). The detailed research questions and subquestions are described below.

### Theory of Change

We developed a shared understanding of ITL in the IB ecosystem in the form of a theory of change. The detailed research question and subquestions related to the theory of change for ITL were as follows:

What theory of change regarding ITL operates within the IB ecosystem, at the organizational, school, and classroom levels?

- a. What programmatic elements in the PYP, MYP, and DP support ITL?
- b. What outcomes do IB educators attribute to ITL in the PYP, MYP, and DP?
- c. Do the IB's approaches to ITL align with evidence-informed promising practices?
- d. To what extent do schools' perspectives and practices align with the IB ITL theory of change?

We conducted iterative theory-building and analysis through an academic literature review (results of which are shown above), interviews with key personnel, analysis of IB documents, and ground-truthing against interviews at the school level.

Our first step was to conduct interviews with seven key informants playing leadership roles. We identified these key personnel through a combination of direct recommendations of IB staff and snowball sampling. Snowball sampling refers to the fact that early interviewees suggested several of the later interviewees. The snowball sampling technique has the advantage of quickly and cost-effectively locating relevant informants for qualitative, descriptive studies such as this one; a limitation is that it does not produce representative samples of a population (Parker et al., 2019), but that was not the goal—rather, the goal was to have enough input from a range of interviewees who had knowledge of IB curriculum, instruction, and professional development contexts, as well as the PYP, MYP, and DP (we interviewed 28 individuals total; see Table 3 on pp. 22-23 for details). One interviewee was the director of an IB regional association, one was a secondary school IB coordinator, three were involved with global programme and curriculum development, and two were involved with professional development within IBO. For these interviews, we followed the protocol shown in Appendix D, transcribed them, and analyzed for thematic concepts to inform the Organizational and Instructional Theory of Change and other results reported below.

Based on the initial interviews, we identified a set of six key documents informing the IB approach to ITL. Three of these documents span IB's four-programme continuum: *Programme Standards and Practices* (IBO, 2019), *What is an IB Education?* (IBO, 2017), and the *IB Learner Profile* (IBO, 2013a). The other three documents are specific to programmes: *Primary Years Programme: Developing a Transdisciplinary Programme of Inquiry* (IBO, 2012), *MYP:*



*From Principles into Practice* (IBO, 2014), and *The Diploma Programme: From Principles into Practice* (IBO, 2009). We have drawn on these documents for our responses to the research questions below.

To synthesize a shared understanding of ITL from the academic literature, these key stakeholder interviews, and the key IB documents, we conducted a qualitative content analysis using Microsoft Excel™ spreadsheets. We identified major themes and concepts related to ITL as identified in the literature, in the key IB documents, synthesized their meanings as evident across the data sources, and integrated them into a theory of change that showed the implicit and explicit interrelations of actions with intermediate and final outcomes. The conceptual structure of this theory of change is based on literature within education (Amundsen & D’Amico, 2019; Connell & Kubisch, 1998; Organizational Research Services, 2004; Weiss, 2000).

## Meanings and Practices of ITL

To get to a greater level of detail on the role of ITL in the IB ecosystem, we examined how ITL is understood, practiced, and learned about in a sample of IB schools. The detailed research questions and subquestions for this aspect of the study were as follows:

What does ITL mean to key IB stakeholders, and how does it vary across the IB continuum?

- a. What student benefits do key IB school stakeholders ascribe to, or expect from, ITL?
- b. What limitations or tradeoffs do key IB school stakeholders associate with ITL?
- c. To what extent do key IB school stakeholders’ understandings and expectations of ITL vary across the IB continuum?
- d. What factors facilitate ITL implementation?
- e. What factors constrain ITL implementation?

How do IB faculty learn about ITL practices?

We recruited 8 schools within 2 IB regions; 4 of these schools are in one state within the western United States, and 4 are in multiple nations within western Europe. These 8 schools spanned PYP, MYP, and DP (see Table 2). We identified schools in the United States based on existing contacts in our regional context; we identified schools in the European context (specifically Germany, Switzerland, and Netherlands) based on recommendations of leadership at the IB Global Centre in the Hague. We targeted schools in English- and German-speaking locales for ease of communication since the first two authors of this study both speak English as their first language and the first author also speaks German.

**Table 2**  
Schools Recruited to Participate

| ID | National Context | IB Programmes |
|----|------------------|---------------|
| 1  | United States    | PYP           |
| 2  | United States    | DP            |
| 3  | United States    | PYP           |
| 4  | United States    | MYP & DP      |
| 5  | Germany          | DP            |
| 6  | Switzerland      | PYP, MYP, DP  |
| 7  | Netherlands      | PYP           |
| 8  | Netherlands      | MYP & DP      |

We planned to make at least one visit to each participating school and conduct focus group interviews with teachers, as well as individual interviews with select teachers and school leaders (i.e., heads of school<sup>7</sup>, IB programme coordinators<sup>8</sup>, and/or other instructional leaders) from December 2019 through May 2020. The onset of the COVID-19 pandemic in March 2020 disrupted this plan, forcing us to cancel our trip to Europe for on-site interviews at the sites in Netherlands, Germany, and Switzerland. We completed some in-person interviews in the United States prior to the pandemic, and then adjusted our procedures to utilize Zoom videoconference-based interviews for the remainder, to the extent possible. We extended the timeline for completing the interviews, as well, because school personnel were occupied with urgent adjustments to school activities related to the pandemic. The interview sample ultimately completed at schools is shown in Table 3; we were unable to schedule Zoom interviews with school personnel in schools 7 and 8 due to pandemic disruptions. One result of those disruptions is that our interview sample has few educators from MYPs.

**Table 3**  
Focus Group and Individual Interviews Completed by School

| School                   | # of Focus Groups & Interviews  | # of IB Educators Interviewed |
|--------------------------|---|-------------------------------|
| USA PYP 1                | 2 Teacher Focus Groups<br>2 School Leader Interviews                                    | 9                             |
| USA PYP 2                | 2 Teacher Focus Groups<br>1 Individual Teacher Interview<br>1 School Leader Interview   | 11                            |
| USA MYP & DP 1           | 1 Individual Teacher Interview<br>1 School Leader Interview                             | 2                             |
| USA DP 2                 | 1 Teacher Focus Group<br>1 Individual Teacher Interview<br>1 School Leader Interview    | 6                             |
| Germany DP               | 2 Teacher Focus Groups<br>1 Individual Teacher Interview<br>1 School Leader Interview   | 8                             |
| Switzerland PYP, MYP, DP | 2 Teacher Focus Groups<br>1 Individual Teacher Interview<br>2 School Leader Interviews  | 10                            |
| TOTAL                    | 9 Teacher Focus Groups<br>8 School Leader Interviews<br>5 Individual Teacher Interviews | 46                            |

<sup>7</sup> In the United States, heads of school are usually referred to as “principals.” We employ the more globally used term “head of school” throughout this report.

<sup>8</sup> In this study, we reference IB coordinators (as well as heads of school) as a type of school leader since IB coordinators spoke of themselves (and others) spoke of them as instructional leaders within their schools.

The interview protocols for teacher focus groups, teacher individual interviews, and school leader interviews appear in Appendices E, F, and G, respectively.

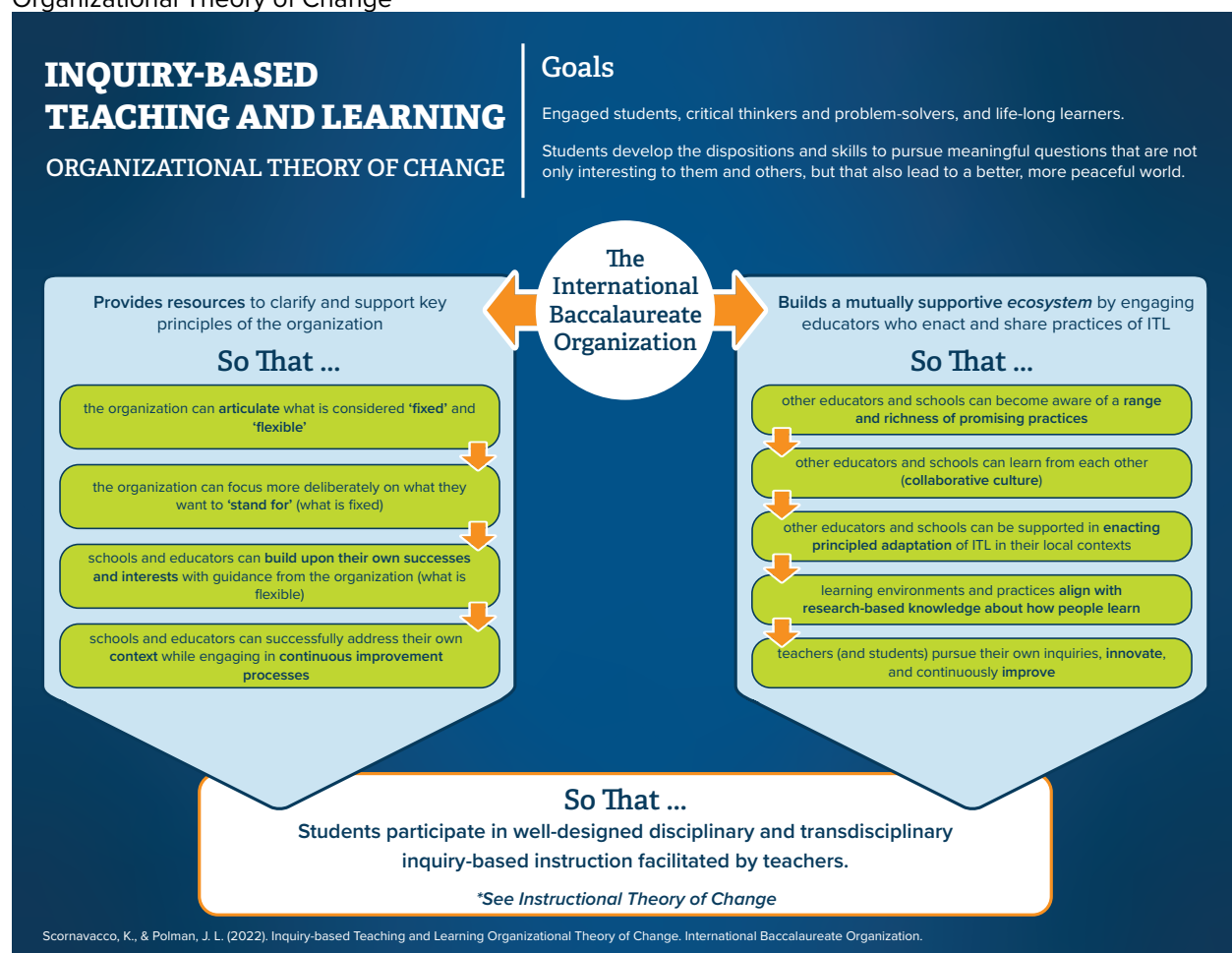
To synthesize our findings from these meaning and enactment research questions, we conducted a qualitative content analysis using Microsoft Excel™ spreadsheets of the above focus group and individual interviews. We identified major themes and concepts related to each research question and the outcomes of the literature review and theory of change, synthesized their meanings as evident across the data sources, and integrated them into the findings section below.

## Findings

### Theory of Change

Based on our analysis of the 7 interviews of key leaders and stakeholders in IBO, along with data from the key IB documents, we articulated the Organizational Theory of Change (see Figure 3) with two key strategies that the IBO pursues: 1) provide resources to clarify and support key principles of the organization; and 2) build a mutually supportive ecosystem by engaging educators who enact and share practices of ITL. We identified a clear theme throughout the interviews that the IBO relies on its guidance documents and shared history and expertise to meet its ultimate aims, and similarly to engage in a process of continuous improvement as a global education organization. We saw intentionality and consistency around articulating key principles of the organization; stakeholders we interviewed echoed the IBO's mission statement and all guiding documents featured ITL. Interviewees frequently referenced the organizational mission with some even sharing the IBO's history as a way to illustrate its aims. Simultaneously, interviewees frequently referenced the flexibility that IB schools and teachers have to adhere to these principles and reach the goals of ITL.

**Figure 3**  
Organizational Theory of Change



Note: This image is available as a landscape-oriented full page in Appendix A.



These two strategies in the Organizational Theory of Change are shown in Figure 3 parallel to each other as the strategies appeared equally important, and they also mutually reinforced one another. In other words, the resources support the participants in the ecosystem such as teachers and school leaders, and the actions of educators in the ecosystem produce new resources. Below, the organizational strategies are interim outcomes, with each interim outcome in the green boxes leading to the next. The organization's redesign of its evaluation process is a notable example of IBO's attention to the importance of principled adaptation (Kirshner & Polman, 2013) as well as its commitment to continuous improvement as a learning organization (Bryk et al., 2015). As one of the organization's leaders shared, the evaluation process up to recently had been more compliance-based with schools needing to prove that they had implemented certain standards and practices consistent with the IBO's guiding documents. Yet, this leader reported that in recent years there has been more attention on the institutional level to the evaluation process reflecting larger goals and processes of inquiry and learning. This leader reported that:

*We're trying to shift to a 'do as we do' so that it will be an evaluation that asks schools to engage in the same kind of inquiry about themselves that we're asking teachers to teach their students to do and that the result will be, we hope, that schools will see themselves as learning organizations and will be supported by the IB to become a learning organization.*

Similarly, IB educators across the sample interviewed for this study commented about the importance of continuous learning, both for students in IB classrooms and for teachers and school leaders who create and enact the systems and structures that comprise the IBO. IB coordinators and other school leaders interviewed confirmed this shift, lauding the self-study processes that schools conduct approximately every 5 years.

We directly link the Organizational Theory of Change (shown in Figure 3) to an Instructional Theory of Change (shown in Figure 4). The interim outcome of the organizational level is the facilitation of effective ITL classroom instruction; the actions that strategically constitute effective ITL then lead to further outcomes and the organizations' and schools' intended larger impact of students contributing to a better, more peaceful world.

As shown in the Instructional Theory of Change, well-designed and well-facilitated disciplinary and transdisciplinary ITL has several features, shown in the Classroom Actions section. We note that at various times and with deliberate developmental considerations in IB classrooms, students sometimes conduct inquiry within traditional disciplines, such as science, mathematics, history, or literature. At other times, students carry out "transdisciplinary" inquiry (Herrenkohl & Polman, 2018) involving multiple disciplinary practices and ideas. Developmentally, more transdisciplinary inquiry takes place more readily in the PYP, and inquiry that goes into more depth in single disciplines is focused on less readily in the DP. How well-designed and well-facilitated classroom inquiry is depends on teacher actions (shown in orange) and student actions (shown in yellow); the arrows between students and teachers reinforce an ideal in which students and teachers *work together* in a productive community of learners (Rogoff, 1994). Relationships between teachers and learners are important, and many of their respective actions have reciprocal relations. For example, teachers listen deeply to students' questions and curiosities, and then pose questions, interact with students in ongoing dialogue, and provide feedback on possible directions for student inquiry. In addition, teachers

provide strategic supports for students to successfully pursue practices that enable them to create products for audiences.

**Figure 4**  
Instructional Theory of Change



Note: This image is available as a landscape-oriented full page in Appendix B

In inquiry-based classrooms, teachers invite students to ask questions and pursue curiosities they have; students' questions and curiosities drive classroom activity, and provide purpose for their work on a daily basis and across time. Teachers challenge students to learn to work independently, as well as collaboratively, during their inquiries. Students collaborate with one another on separate and shared inquiries through talk, discussion, and other active interaction. Students spend time creating products or performances, and share them with audiences who value what the students have accomplished. Inquiry allows students to take action to contribute meaningfully to their communities, where communities might be geographically defined (such as a hometown, a nation, or the entire globe), or where communities might be based on cultural or affinity groups. And along the way and/or afterward, students have opportunities to engage in reflection that drives both their learning and overall development.

Inquiry-based classrooms are places where students can carry out these sorts of inquiry actions because teachers ensure they provide appropriate supports and scaffolds for their students. Thus, teachers are not just setting their students free to do inquiry; rather, teachers

are providing structures and coaching supports for students learning to do effective inquiry. Specifically, teachers need to listen deeply to students' questions and curiosities in order to help them connect those interests with disciplinary ideas and practices which the students do not yet know. Teachers ask their students questions to understand what their students are interested in and what they know so they can assist their students in thinking more deeply about their inquiries, refining their inquiries in productive directions. Since the students are in the process of building their conceptual understandings and expertise at carrying out practices that support their inquiries, teachers provide strategic supports for developing practical and conceptual knowledge. Since students do not automatically know how to collaborate effectively, teachers explicitly scaffold students in developing their collaboration skills, directly supporting their students' ongoing inquiries. For the classroom physical environment to support these activities of conferencing, collaboration, and active, student-driven inquiry, schools and teachers must ensure that physical movement and dialogue is possible. Importantly, the support that teachers provide is not only cognitive; they show that they care about their students, and they demonstrate caring for them as full human beings through daily action. Teachers also foster a learning community in the classroom, where students care for, listen to, and support one another in their inquiries and learning. In an effective learning community, students find the support of and interaction with their peers and teachers to be helpful.

According to this theory of change, the actions and conditions described above enable students to participate in well-designed and well-facilitated disciplinary and transdisciplinary ITL, resulting in a number of interim outcomes (see the light green box at the far right of the Instructional Theory of Change). As a result of the ability to pursue questions and curiosities, supported by their teacher and fellow students in a productive learning community, students are engaged and interested in their day-to-day work. Students can exercise active agency, rather than being expected to be passive recipients of transmitted knowledge; they have opportunities to exercise agency through expressing their voices, making meaningful choices, and owning their learning. These are major motivational benefits, which encourage students to take risks, overcome uncertainties and any frustrations or obstacles they face along the way, and explore alternative approaches during their inquiries. The well-designed and well-facilitated inquiry classroom enables students to deeply learn concepts and practices that experts within and across the disciplines value. The productive, action-oriented work they do in this caring environment also results in students feeling satisfaction about what they learn and accomplish, because it has real purpose that is connected to their own lives and the lives of others in their communities and the world outside school.

The above summary of classroom actions constitute look-fors or indicators that provide evidence that ITL is occurring. They resonate with how one PYP coordinator described a classroom where ITL is occurring looking:

*It would not be the teacher standing in front of the classroom lecturing. It would be questions, hopefully some of them student-generated. It would be kids exploring things, not always the same things, so whether it looks like small groups or individuals or whatnot. It includes ... What else would I go to? A really wide variety of tools and resources. So not everyone's project looks the same. Not everyone's answering the same multiple choice tests, so a lot of variety in what you're seeing present in the room.*

Educators within IB aspire for students to reach these specific outcomes in the light green box at the far right of the Instructional Theory of Change, so that a cumulative effect can be achieved as students successfully carry out multiple inquiries that are meaningful to them and to others—that students develop enduring dispositions, knowledge, and skills for lifelong learning (as shown in the dark green box at the bottom). If successful, students should come to have dispositions that incline them to believe that because they effectively learned what they needed to respond to a wide range of their questions and curiosities in the past, they will be able to do so as they move ahead in life. Students will develop not only the mindset of valuing curiosity but an assumption that growth is possible. The practical and conceptual knowledge and skills students develop connect to traditional disciplinary learning goals and provide them with powerful tools and capabilities for future action. As the *IB Learner Profile* (IBO, 2013a, p. 1) states, students are called to “strive to be” inquirers. Educators within IB believe that learners who strive to be inquirers, and are supported effectively in being inquirers in their IB classrooms, will become lifelong inquirers. They develop “skills for inquiry and research”; they know how to learn independently and with others”; they “learn with enthusiasm and sustain [their] love of learning throughout life” (IBO, 2013, p. 1).

The ultimate aspirational broad impact of the Theory of Change is one aspect of the overall mission of the organization, and appears in each of the key documents: to “educate and thereby develop people who help to create a better and more peaceful world.” This is obviously a lofty—and extremely difficult to measure—aspiration. We include it in the Theory of Change to mark the guiding vision. When integrated with other IBO priorities beyond inquiry—as stressed in the *IB Learner Profile* (IBO, 2013a) and the other key documents—those inquirers will be internationally minded, and recognize their common humanity and shared guardianship of the planet.

The text above explicates our overall synthesis, describing the broad set of commonalities our analysis revealed based on the combination of key documents and key stakeholder interviews inflected through ideas in the extant academic literature. More detailed findings from stakeholder interviews appear in the remaining findings.

### What programmatic elements in the PYP, MYP, and DP support ITL?

One of the most prominent themes from the document analysis and interviews with IB leaders and educators with substantial experience with the IBO is that, of all the programmes, PYP is exemplary at supporting student inquiry, both in how integrated inquiry is in its unit planning and in primary years learning environments<sup>9</sup>. The fact that the organization expects and supports PYP teachers to develop a curriculum which is framed as a transdisciplinary program of inquiry, and that facilitate their students into conducting six cycles of inquiry per year (related to six designated transdisciplinary themes), means that inquiry is pervasively present and forefronted in the PYP. Inquiry is strongly present in the MYP, as well, through the Personal Project. In the DP, the emphasis on disciplinary courses designed to prepare students for particular disciplinary content that is covered on high-stakes exams limits the degree to which student-driven inquiry guides instruction.

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<sup>9</sup> The majority of participants had over 10 years experience with the IBO, with many of those educators having had even more experience as educators in other schools: 7 participants had 20 or more years experience with IBO, with one of those leaders having had 36 years of experience with the organization.

Yet, there are still glimmers of attention to student inquiry in the DP, especially with the TOK course that IB requires of its Diploma candidates and that supports students in making connections between the disciplines and, most of all, with the EE. As one leader in the IBO who taught in the DP for 35 years described,

*The best examples [of inquiry in the DP] come from students who do a good job with their Extended Essay [EE] ... there are some kids for whom it's really the pinnacle of their academic career at that point because they really embrace it, and they pursue a question that's truly meaningful to them.*

This stakeholder suggested that further research can be done to figure out, “what it is that makes it work for these kids.” She drew from her personal experience, adding, “I know the one thing I did figure out that was really, really critical was spending enough time with them to get at a real question.” She asked, “if somebody could figure out how do you first get them to get that question. Like, what is the teacher’s role in getting them there, and how do you do that, the questioning [with] them.” Though that type of investigation is beyond the scope of this project, the literature review indicated some possibilities for further study and attention in the IB context, and we agree with this leader that such a study could lead to fruitful guidance for DP educators who want to foster more genuine student inquiry.

### Do IB programme documents align in their descriptions of salient ITL concepts?

There is alignment of salient ITL concepts in the overview **documents that speak across all the IB programmes**. In the three overview documents we reviewed, for example, there is explicit attention on students as inquirers who, in the words of the *IB Learner Profile*, “develop skills for inquiry and research ... know how to learn ... and sustain [a] love of learning throughout life” (IBO, 2013a, p. 1). The *Standards and Practices* document and *What is an IB Education?* document describe a philosophy and approach to teaching that is inquiry-based and can foster the attributes outlined in the *IB Learner Profile*. The *What is an IB Education?* document, which the organization characterizes as a means to “outline our educational philosophy,” also refers to “sustained inquiry,” suggesting that inquiry skills and dispositions will not only be developed across programmes, but also that students will be engaged in inquiry practices over a period of time and not just in one class on intermittent days. Furthermore, the fact that the organization conceptualizes IB practices as “approaches” rather than specific classroom actions teachers must take allows for flexibility and choice on the part of teachers and schools, which can be an asset given the range of contexts of IB schools. There are multiple ways to start a lesson, for example, or select a topic of study that supports students in learning to be inquirers. Yet, it is also important to point out that some teachers new to IB may need or want guidance on how, specifically, to enact an “inquiry-based teaching strategy” (Approaches to teaching 1.1.) or what the organization even means by an “inquiry-based teaching strategy.” Fortunately, according to the *Standards and Practices* document, these teachers are not left on their own to learn or refine inquiry-based teaching strategies. The guidance document outlines expectations for both formal and informal professional learning experiences. More findings on how teachers learn inquiry are included below.

The IB **documents that speak to specific programmes** also share similarities to the overview documents mentioned above in that the programme-specific documents advance the notion that teachers and schools can support students *as inquirers*. The documents position students as capable and curious, and there is an emphasis on the importance of students



developing dispositions and skills that lead to further inquiry and lifelong learning. In the PYP document, *Developing a Transdisciplinary Programme of Inquiry (2012)* especially, there is a theme of *inviting student inquiry*, suggesting that students have agency in whether and/or how they might come to the learning experience and engage in the unit of study. The notion of “inviting” student inquiry does not show up as strongly in the DP guidance document, *The Diploma Programme: From Principles Into Practice*. Similar to what we heard in interviews with stakeholders, attention to student inquiry is strong in the PYP document, not as strong but still present in the MYP document (*MYP: From Principles Into Practice*), and much less present in the DP document. A quick term search exemplifies this point. The term “inquiry” shows up 424 times in the PYP document, 141 times in the MYP document, and 8 times in the DP document. Similarly, the *PYP Enhancements* document, published in 2018, references “inquiry” throughout its 17-page guide, with the term “inquiry” used in both early, middle, and later pages of the document. We elaborate on this topic in the findings below where we share teachers’ perspectives on using the IB documents.

There are also differences in ways that the programme-specific documents speak to particular issues associated with student inquiry. Below is a list of some of our observations about four important aspects of ITL, developed from the literature review, and how these concepts show up differently in the programme-specific principles and practices documents.

*Teacher Collaboration* - Collaboration between teachers to design learning experiences for students that foster student inquiry is explicitly mentioned in the PYP and MYP documents only. In the DP document, the purpose of teacher collaboration appears to be more logistical, mission-oriented and individualistic, with examples such as to *coordinate timelines and develop shared understandings of the overall vision* of the DP and *“each other’s subject assessment requirements.”* The teachers, according to the guidance document, are not necessarily planning or reflecting *with each other* on the design of shared courses or on course content synergies. **Overall in the DP document, teacher collaboration is spoken about in more general terms and geared toward professional learning overall, not to a topic or theme of fostering student inquiry.**

*Student Collaboration* - Similarly, the importance of collaboration between students, including learning *from* and *with* each other is more emphasized in the PYP and MYP documents than in the DP documents, where students investigate answers “for themselves” and assessments “reward evidence of *independent student thinking*”. Overall, DP documents emphasize notions of *independence* and *independent thinking*. For example, the term “independent” is mentioned only once in PYP document but 9 times in the DP document. And for that one time in the PYP document, the term referred to independent *schools*, not to students. In the MYP document, the term is mentioned 12 times, and two of those times, there is an additional phrase of, “and in collaboration with others” and one time it’s in reference to service learning, suggesting that students are community members/contributors as much as they are their own persons. **This pattern reflects reasonable developmental expectations of students becoming more independent across their lifespans but warrants some caution because collaborating is such an important lifelong skill.**

*Disciplines/Disciplinary Learning* - The PYP document leads with an idea of *transdisciplinary* units of inquiry; the MYP speaks to *interdisciplinary* learning; and the DP attends to *discipline-specific* learning with a TOK course designed to support students in making connections between disciplines. The PYP document explicitly mentions connections between the disciplines

and students' genuine curiosities or questions. The MYP document builds an ITL connection based on personal relevance and a focus on conceptual learning where students' inquiries drive understanding of complex ideas that transfer to new contexts, including across disciplinary lines. In the DP document, the connection between inquiry and disciplinary learning is more general, with statements such as "different subjects also provide a number of opportunities for students to design their own inquiry, with the EE as the ultimate structured inquiry exercise" (p. 37). There is limited guidance on how student inquiry and disciplinary learning relate. **Given the issues of interdisciplinarity and transdisciplinarity in literature (see pp. 17-18), this finding warrants further exploration.**

*Criticality* - The DP document is the only guidance document under review for this study that refers to *critical inquiry*, though the MYP document speaks to *critical thinking*, with a list of ways that students might analyze and evaluate issues and ideas. In the PYP document, *Developing a Transdisciplinary Programme of Inquiry*, we found only three mentions of *critical evaluation* of messages and no mention of critical inquiry, critical thinking, or critical evaluation in the PYP Enhancements. In building upon our literature review, and particularly work by Beach and Myers (2001) and Polman et al. (2021), we notice a missed opportunity for documents to speak more directly about links between inquiry and critical thinking, and most of all, inquiry and the making of new worlds or social imagination (Ivey & Johnston, 2015; Gutiérrez, 2016; Toliver, 2020). While it is undeniable that critical thinking is paramount in the DP, with a recent study also showing that participation in the DP fosters high level of critical thinking for students (Hopfenbeck et al., 2021), there is still room for improvement for IB to attend more directly to *creating* new worlds through a critical lens. There could, for example, be more deliberate integration of critical perspectives on societal injustice, fueled by such realities as racism, sexism, and classism (Esmonde & Booker, 2017; Gutiérrez & Jurow, 2016; Morales-Doyle, 2017). IB may purposely be advancing an idea of a developmental progression of criticality, suggesting that students might need to gain an appreciation before taking a critical stance toward the world, such as noticing the different rights or freedoms people have in different contexts. **It may be worth exploring this idea further with teachers and leaders at IB schools given that some students, even at the early ages, may already be asking important, critical questions.**

The above points relate to the alignment of ideas and concepts related to ITL across the IB documents; for further explication of how the documents get used by teachers to learn about ITL, see the findings below under the research question How do IB educators learn about ITL practices?

### Do the IB's approaches to ITL align with evidence-informed promising practices?

Our response to this question relates extant literature on ITL to practices in IB schools as articulated in the key documents and interviews.

IB documents and our interview findings align with the general description of inquiry described in the literature review, including the notion that there is a continuum of related ideas and practices. The IB appears to be in alignment with trends related to ITL in the disciplines of science, history and social studies, mathematics, and also literature and language arts, particularly in the earlier grades and in culminating projects of the DP. At PYP, for example, the organization asks that, "knowledge, concepts and skills from any of [the] subject areas be included in the programme of inquiry whenever there is an authentic connection to the students'

learning and understanding of the transdisciplinary theme.” (Developing a Transdisciplinary Programme of Inquiry, p. 11). In a PYP science unit on mixtures and solids, for example, teachers used a strategy called Split-Screen Objectives that supported students in connecting content objectives with learning skills, while also situating the unit in an important global issue, oil spills. As one PYP teacher shared,

*This year, we decided to teach [an inquiry unit on mixtures and solutions] from the perspective of there being real problems in the world. So, the Exxon Valdez oil spill in Alaska. This is a problem that we have. We still have a problem, there’s still oil in the water ... there’s still oil spills happening in the world. ... Now how can you take the principles you’ve learned about separating mixtures and then go out in the world and do something about it? And the buy-in was a lot greater. **And the understanding of the concepts were greater because they are obviously super-passionate about oil floating around the ocean.***

In other words, this unit integrated: 1) core ideas of the discipline (in this case, science); 2) practices and skills used by professionals (i.e., scientists) outside of school contexts; and 3) topics or issues that matter to society, above and beyond students’ individual interests.

In the older grades, when DP teachers spoke about promising inquiry practices—or inquiry-based units that they were most proud of—they spoke most frequently about their course’s IA, the students’ EEs, or their students’ CAS projects. These teachers referenced activities and experiences that spoke directly to the “so that’s” in the Instructional Theory of Change (e.g., that students were engaged and interested in their learning, and that students’ projects were connected to their lives outside of school and the communities). A CAS coordinator, for example, shared examples of a group of students who planned a leadership and confidence seminar for middle school girls, and a group that created a food pantry at their school that served students and families year-round, rather than just during their annual food holiday food drive. While engaging and community-oriented, however, these projects were not always aligned with a particular discipline or disciplines, or embedded within disciplines. These examples highlight an area of improvement for the DP: that to be even more aligned with research literature on inquiry-based instruction, the DP curriculum could more fully integrate student interests and inquiries **with** disciplinary practices and skills. As one DP Physics teacher said:

*I would say that there are lessons and content and curriculum that lend itself really well to inquiry. Like the content itself (Physics) ... there’s so many opportunities for doing authentic inquiry. And I think we really do [inquiry-based instruction] during the Internal Assessment, and during the Extended Essay, **so there are like some components of the Diploma Programme that require it, and that exemplify it.** And that’s awesome. And so that should not change at all. But like, **we should keep those opportunities because that’s when the students are really getting their best experience.** But I think **something needs to change with the testing component and the content that’s assessed.** Just so that we can go in more depth and have more full inquiry experiences across the board instead of in just these little pockets*

***within the program.*** Like I feel like each class has, like, you know, their, their Internal Assessment, and it's like, their 'There's our inquiry. Hurray.' And that's not how it should be. It should be like a whole way of learning throughout the entire programme."

Thus, based on our analysis of IB documents and interviews of stakeholders, the ideals of disciplinary and transdisciplinary inquiry described in the literature review of contemporary academic research seem to be shared among the IB community. IB documents and interviewees stressed that both discipline-specific inquiry and discipline-spanning inquiry are meant to be supported and enacted in IB schools. Although documents talk about disciplinary learning goals, DP teachers reported that the subject area guides did not support them in using an inquiry approach to reach such goals. We elaborate on this finding in the recommendations.

### To what extent do schools' perspectives and practices align with the IB ITL theory of change?

When asked to ponder ITL in their classroom or school, all IB educators in the study agreed on the aspirational visions of ITL, and reported that the Instructional Theory of Change captured what they perceived as important in ITL, including the classroom actions and interrelations of actions with intermediate outcomes and final goals. The logic of the Instructional Theory of Change made sense to them, and they shared multiple examples of their own learning and experiences within the IB ecosystem that further confirmed our initial draft of the Organizational Theory of Change. As one of the school leaders shared, "we're all part of this IB community. That's part of the power." This same leader shared that IBO "gives [them] the steps to follow," but that they follow it in their own way, with deep exploration and shared analysis of how they are working together, intentionally, as a school community that also networks with IB educators. The benefits of being a part of this larger ecosystem offered them a range and richness of possibilities for ITL, though it was evident that opportunities to engage with these possibilities—to see models, try out new practices, have others in the classroom with them to purposefully design together—varied by programme. PYP educators, for example, shared more examples and spoke more often about their coordinator in the classroom with them, designing with them and modeling or co-teaching important ITL practices when compared to MYP or DP educators. It was the PYP educators in this study, too, who had a shared book that not only offered inspiration but also what they perceived as practical examples of ITL in the classroom.



*We're all part  
of this IB  
Community.  
That's part of  
the power.*

Although it was beyond the scope of this study to observe teachers' instructional practices in action, DP educators' reports showed systematic variation between how often and how purposefully they (and their students) seemed to engage in classroom actions described in the Instructional Theory of Change. As described in the sections above, much of this variation appeared to derive from the range of expectations and collaborative opportunities for rich and productive ITL, including in guidance documents such as subject area guides, where there are not only more expectations of content coverage, but fewer examples and integration of ITL throughout the curriculum.

## What does ITL mean to key IB stakeholders, and how does it vary across the IB continuum?

To address this research question, we analyzed 22 interviews of 10 school-based leaders (heads of schools and IB coordinators) and 36 teachers. First, we examined the **range of meanings** overall and how they vary across the IB continuum (i.e., schools that offer PYP, MYP, and DP). Then, we looked at the **benefits** ascribed to and expected from ITL, as well as the **tradeoffs**. Finally, we examined **how IB faculty learn** to incorporate ITL into their pedagogy.

### Meanings of ITL

Overwhelmingly, across all regions and schools, IB educators spoke of ITL as an approach to learning—and living—that engages students’ curiosities and has lasting benefits for students as learners and contributors to the world. Teachers and school leaders reported that the emerging Instructional Theory of Change captured what they perceived as important in ITL, making remarks such as “it aligns closely to what we’re trying to do as an IB school” (PYP IB coordinator); “Everything seems right. Everything seems really right.” (PYP teacher); and, “Man, I wish I’d said more of this. I agree with everything I’m seeing” (DP teacher). As described earlier, teachers and school leaders also helped refine the Instructional Theory of Change, offering suggestions for re-wording a term or phrase and for adding in more explicit reference to key ideas of students creating products or performance, and students reflecting. Additionally, teachers and school leaders stressed that the Instructional Theory of Change should show how teachers and students work and interact together to create learning communities, which led to the addition of the reciprocal arrows connecting teachers and students. It was notable that *all* teachers and school leaders who reviewed the Instructional Theory of Change appreciated the larger goals of ITL as described, and that some of the educators also spoke to how they would use it to further support teacher learning and collaboration. The emerging Instructional Theory of Change could, in the words of one PYP coordinator, be a shared tool for inquiring into *how* to reach each of the larger goals, with guidance and shared exploration of each of the practices listed as key classroom actions:

*This is what we’re aiming for. It’s not a choice whether we look at contributing to a better or more peaceful world, how we do that as a school, that’s what we can explore and inquire into, but we want students, for example, to be engaged and interested in the learning. That’s a non-negotiable, and then we make it up as a school. I think it’d be quite useful as a document certainly for me to use with the teachers and then explore the practices.*

The overarching goals of ITL, as described in the Instructional Theory of Change, remained throughout the study, with educators sharing that there were multiple ways to enact each of the practices. “I think it’s more a question of putting it into practice,” for example, stated one DP teacher, “how do you do this?” In the recommendations section of this document, we share further ideas for how IB educators and leaders can use the Organizational and Instructional Theories of Change developed through this research project to support putting elements of ITL into practice.

During initial stages of our research, we had also asked IBO leaders to share what ITL meant to them. Not surprisingly, these organizational leaders made similar remarks as teachers and school leaders who are working collaboratively to enact these principles in IB schools later



shared with us. An analysis of the initial interviews with IBO leaders also revealed that *students' questions* were of primary importance, along with ideas about the role of the teacher as a facilitator. These stakeholders—similar to the teachers and school leaders—also brought up that high-quality ITL can take time, and that the time to engage in high-quality ITL was worth it because of its overall benefits to students.

Table 4 below summarizes elements of ITL at the classroom level that IB educators spoke to when responding to similar interview prompts. This snapshot lists elements of the Organizational and Instructional Theory of Change that all stakeholders mentioned, lending greater credibility that they are more universally salient (column 1 in Table 4), versus elements that some stakeholders mentioned (column 2 in Table 4). Though IBO stakeholders varied in what they emphasized and stated as important to successful ITL at the classroom level, the variations did not reveal inconsistencies so much as differences in what interviewees mentioned and explicated. Our analysis also revealed that there were comments made by just one IBO leader yet multiple school educators that were more practice-specific, offering a specific classroom action a teacher can take to support ITL (e.g., questions are recorded and posted so that the questions are visible to everyone in the classroom). It is likely that other interviewees also support those practices, but they may not have considered them at the time and/or do not see them as required. As revealed in IB documents, there is flexibility and choice built into IBO's approach to teaching, with the goal of key principles of ITL as a guide, especially in the PYP.

Though all aspirational toward larger goals of ITL, IB educators' perspectives on what ITL means to them as practicing teachers or school leaders varied in notable ways across programmes. We elaborate on this distinction throughout the findings section, starting first with sharing two themes that emerged from our analysis of interview data. First, PYP educators appeared to use similar terms (i.e., shared language) when talking about elements of ITL in action in the classroom. All PYP educators, for example, spoke to the importance of “provocations.” Many DP educators spoke to the importance of engaging student curiosities and interests at the start of the unit, as well, though DP educators did not use the term ‘provocation.’ While we recognize that DP educators may indeed still be offering ‘provocations’ in their classrooms, we wonder about the extent to which it may be helpful for DP educators to use shared language as the PYP teachers seemed to do so that, together, they can more easily exchange ideas and delve deeper into examples and implications for effective provocations for a unit of study. Similarly, using similar terms that matter to ITL and resonate with educators could also support cross-programmatic work in continuum schools, as well as with programmes that partner with schools within the same school district or jurisdiction.

In addition, PYP educators spoke frequently about making questions visible in the classroom and many described examples of students working in groups, often with the teacher or IB coordinator; and sorting, talking through, and refining questions in order to make explicit connections to transdisciplinary themes. DP educators, too, spoke about the need to support students in developing and refining their questions, though they did not as frequently offer examples of using techniques that would make the students' thinking visible to each other. Again, we do not interpret this to mean that DP educators do *not* use these practices; rather, that this is a classroom example that just DP educators did not mention as often in the interviews. Instead, DP educators spoke frequently about constraints to their time with students to develop and refine questions with each other: the need to cover content and the lack of time dedicated in IB curriculum to engage with student-generated questions that tie into disciplinary themes. We

discuss this further in the section on Factors That Constrain ITL Implementation (pp. 28-29).

**Table 4**

Interview Results Regarding Classroom Level Aspects of Inquiry

| <b>All stakeholders mentioned:<br/>(all IB leaders &amp; IB educators)</b>   | <b>Some stakeholders<br/>(IB leaders and/or IB educators)</b>   |
|--|---|
| <p>Goal of ITL is student engagement and pursuit of questions that are meaningful to students.</p> <p>A starting place in the inquiry cycle are questions, and questions that are of interest to students.</p> <p>The role of a teacher is to be a facilitator, and students have a role in shaping what questions the class will pursue.</p> <p>ITL teachers provide coaching, with a good deal of formative assessment; as one PYP teacher stated, “feed forward” instead of feedback—emphasizing formative rather than just summative assessment.</p> <p>High-ITL classrooms are interactive and there is a lot of discussion.</p> <p>Students who engage in high-ITL experiences “learn how to learn.” They can apply their inquiry skills to other situations for the rest of their lives.</p> <p>ITL takes time, and often teachers—especially in DP—don’t feel they have the time to facilitate authentic student inquiry. The need for more content coverage and external exams are also driving forces in the DP.</p> | <p>Teachers must be well-versed in ways to conference with students, building upon student interests and questions that truly matter to the student.</p> <p>Teachers must be well-versed in questioning strategies, including knowing ways to follow-up with students that prompt students to think even more deeply (instead of just correcting) and in helping students broaden or narrow their own questions.</p> <p>The start of a unit of inquiry includes some type of provocation.</p> <p>There is an expectation that questions are recorded and posted, so that the questions are visible to everyone in the classroom.</p> <p>Teachers must support students in learning how to collaborate across all ages (teach collaboration skills).</p> <p>In high-ITL classrooms, there is a lot of independent thinking and independent work.</p> <p>Inquiry-based classrooms must have protocols and rules that, “make it safe for somebody to throw out an idea and play around with it and a kind of sense of playfulness.” (IBO Leader)</p> <p>Classroom set-up must allow for physical movement and dialogue between students.</p> <p>In high-ITL classrooms, students would know why they are working on something. Student should always have a sense of purpose.</p> <p>Because of ITL, students learn to manage time and stress.</p> <p>Because of ITL, students learn to be “okay with the gray”(DP coordinator), with uncertainty, and with multiple, possible answers.</p> <p>ITL may look different in each discipline.</p> <p>ITL involves students in taking action.</p> <p>Teachers must be well-versed in “breaking down the thinking skills” (IBO Leader) that may be used in a longer-term inquiry project, such as a lab in a science classroom, and modeling those thinking skills. <i>(Note: PYP educators also spoke about the importance of visible thinking skills, including “visible thinking routines”)</i></p> <p>An overall goal for high-ITL experiences is to make the world a better place to solve important societal problems.</p> <p>The PYP is exemplary at supporting student inquiry, both in how integrated inquiry is in its unit planning and learning environment.</p> |

## Benefits

IB educators generally highlighted greater student **engagement, excitement, and motivation** as some of the first benefits that come to mind about ITL. Engagement and excitement may engender a greater sense of **well-being** among students in school. If the children are engaged, they will be less likely to exhibit problematic behavior; as one PYP head of school put it, “they’re doing what they want to be doing, so they’re not pushing against that authority figure.” ITL also has the benefit of making instruction potentially applicable and **accessible** to all students; in contemporary education-speak, it is a natural and viable means of accomplishing differentiation. Inquiry is also seen as a productive way to cultivate a **growth mindset** (Dweck, 2016); in ITL, students may be more likely to develop greater curiosity while also developing **agency**. Student agency was evidenced by teachers valuing students’ voices and students having meaningful choices to make. As one PYP teacher put it, “teachers letting go and letting students own the process.” As a result, another PYP teacher described “more student talk” accompanied by sense-making around student-generated questions and “more collaboration.” Students develop **confidence** by learning how to struggle and work through challenges. IB educators across the continuum also spoke of changing students’ perceptions as a benefit. The opportunities for students to take action and have voice and choice helped make school **relevant** for them: as one DP teacher put it, “they say I learned something about life.” In addition, students may **develop skills and critical thinking** through inquiry, where questions lead to answers, and then those lead to more and better questions. In other words, ITL can facilitate **deeper learning**, going beyond the superficial. For example, one DP history teacher described how, rather than students just learning a list of facts and events, students who do inquiry-based learning “really understand what happens, they understand the connections, they understand ... the meaning of events ... [and] why these things happen, what the effects were, what would have been possible alternatives.” We heard similar accounts in other disciplines such as science. The result of deeper learning is **greater retention**. And overall, ITL helps **develop lifelong learners who are self-motivated, can be independent as well as collaborative, and are reflective**.

It is worth noting that in addition to all these student benefits, the educators we interviewed see ITL as more interesting and engaging *for teachers* than teaching by telling—as one PYP teacher put it, “it’s more fun to teach and it’s more fun to learn” when pursuing inquiry.

## Tradeoffs

We identified two broad tradeoffs that IB stakeholders discussed in implementing ITL. The first tradeoff was **breadth vs. depth**. On one hand, teachers felt a great deal of pressure to accomplish breadth of coverage—what might be called ticking all the boxes in the curriculum standards; on the other hand, they recognized that covering every single content standard might negatively impact their ability to support students in reaching a greater depth of understanding through inquiry. Teachers struggled daily and annually to balance this tension. One PYP teacher quoted Kath Murdoch<sup>10</sup> on this point, who said “she hits the big overarching standards and does not hit every standard. If you truly want an inquiry-based classroom, it’s just not possible.” A second, related tradeoff was **prepping for standardized tests vs. pursuing student interests and emergent learning opportunities**. In this case, teachers had concerns about preparing their students both for IB exams (specifically in the DP) and for any locally mandated

<sup>10</sup> Kath Murdoch is an educator and author of the book *The power of inquiry: Teaching and learning with curiosity, creativity and purpose in the contemporary classroom* (2015). She has offered professional development sessions for IB educators, attended by some of our study participants.

standardized exams. Since much content of mandated standardized exams orient towards factual knowledge retention rather than depth of understanding related to epistemic practices, DP teachers feared that taking time to support students in pursuing both their interests and productive emergent learning opportunities in the course of inquiry could mean teachers would be unable to cover what might appear on exams.

### Factors that Constrain ITL Implementation

There are several factors that constrain ITL implementation, as reported by IB educators we interviewed. One of the greatest challenges, as with schools reaching many educational ideals, is **time**. Another factor that can, when not managed or understood productively, constrain ITL implementation is the need to meet IB or other educational **standards**. The schools in our study were seeking *both* to implement IB expectations and they are expected to meet local or national learning standards spanning the disciplines. Effective ITL implementation demands that educators in schools deeply understand the IB vision and be able to create synergies across concepts and elements within the IB curriculum and their local disciplinary standards. Sometimes, educators do this through curriculum mapping, which involves making tables of interrelations across frameworks. A related issue in planning and implementing curriculum is a problem alluded to in the literature review: some educators—including among our interviewees—hew to an **outdated notion that conceptual content learning of the basics or the foundation must precede inquiry**. Contemporary curriculum theory, supported by wide-ranging empirical evidence, supports the notion that students will be best able to develop conceptual understanding within the context of inquiry that they find engaging and motivating; in such circumstances, students feel a “need to know” and also integrated knowledge and associate concepts in memory with the rich contexts that inquiry provides (e.g., NRC, 2000a). This theory does not assert that basic skills are irrelevant or that getting to productive inquiry questions is immediate; rather, it implies that weaving and integrating content and basic skills instruction *within* inquiry processes is more effective than holding off on inquiry until the end of a unit or school year.

Our interviewees described several factors that they believed would facilitate implementation of ITL like the ideals, and also counter some of the factors that could otherwise constrain implementation. Most of what facilitates implementation of ITL amounts to **creating and sustaining cultures**. How educational professionals spend their limited time is an important aspect of culture. Time to plan effectively for and support ITL is maximized through structures that facilitate teachers’ reflection and preparation work in addition to their direct instructional work. The supportive resources and ecosystem referred to in the Organizational Theory of Change are important contributors to IB schools’ cultures for ITL. The culture also includes what one PYP teacher called a “culture of curiosity” among students and educators, where leaders and teachers buy in to the IB vision of inquiry. Schools’ identities as places where ITL is valued are made clear in job searches and become part of evaluating candidates. Interviewees believed that the cultural practices of ITL should be examined and refined through teacher collaborative work, often over extended periods of time in professional learning

*Important contributors to IB schools’ cultures for ITL includes what one PYP teacher called a “culture of curiosity.”*

experiences that would involve genuine teacher collaboration. These effective professional learning arrangements at school and IB organizational levels again are key to addressing the tensions of navigating goals and aspirations of different standards documents, as well as curricular sequencing issues. In addition, the regular cycles of IB evaluation can result in productive self-studies that reveal and prompt schools to subsequently address tensions with meeting standards and planning curriculum. A further practice that enhances the ITL culture is that some school communities—including students, teachers, administrators, and families—gather to celebrate products and performances that result from student inquiry. In PYP, these are institutionalized through the Exhibition, and in MYP through the Personal Project. In the DP, teachers often work effectively with their students to support and reflect on inquiry-based learning through the institutionally mandated and supported IAs, which they frequently collaborated on with other educators at their school (i.e., peer teachers and IB coordinators).

*A further practice that enhances the ITL culture is that some school communities gather to celebrate products and performances that result from student inquiry.*

## How do IB educators learn about ITL practices?

In this section, we describe the key contributors to educators' learning based on our interviews: engaging in a collaborative culture within the IB ecosystem, committing to clear visions of ITL, referring to (and relying on) resources that clarify and support key principles of ITL, and participating in learning opportunities that often vary by programme.

### Engage in a collaborative culture within the IB ecosystem

IB educators appeared to deepen their learning about ITL practices by participating in a collaborative culture within the informal IB ecosystem. A common sentiment participants in the study reported, for example, included remarks such as, “I meet with other IB coordinators all the time,” and “I’m sharing this resource at our next roundtable,” speaking about an adaptation to an IB unit planner that they wanted to share at a regional meeting of IB schools.<sup>11</sup> Similarly, when sharing highlights of a PYP Exhibition and how it involved students in the process of developing their own central unit ideas and lines of inquiry, a teacher repeatedly mentioned that they could not take full credit for the “intellectual work” that went into the development of the refined Exhibition expectations and process. In this case, the PYP teacher, along with her colleagues, had participated in an informal site visit at another IB school. The teacher “was just so impressed with how connected the Exhibition felt.” She and her colleagues “asked a lot of questions about how they did it.” The interactions between the educators at the schools continued past the day of the site visit, with teachers emailing each other both questions and resources. “I know that if I call them or email them to ask for help with something, they would be happy to [engage in conversation].” The mere presence of a collegial resource, and in this case outside of their own IB school but still within the IB ecosystem, made this educator feel

<sup>11</sup> These regional meetings referred to an “Association of IB World Schools”: independent entities that are neither run nor managed by the IB, though are still in close contact with the IB. For more information on these associations, see <https://ibo.org/contact-the-ib/associations-of-ib-schools/>



confident enough to move forward with taking a risk to try something new with her school's Exhibition. This teacher, too, knew that she was *learning*, not just mimicking what another teacher or school had enacted:

*So, we've taken that model and we use it pretty close to what they did and just adapted it a little bit to suit our school and our needs. **But the big thing that we learned was really developing that central idea for exhibition, and that's where we saw it all kind of came together.** We used to have a central topic kind of for exhibition and school, but then every single group had their own central idea. So, it really didn't feel very, like a cohesive ...*

In U.S. schools in our study, the IB educators across the continuum relied on the IB ecosystem to formally or informally provide pathways to each other as professionals who are both knowledge-builders and creators. "Our district *used to* get all the IB schools together to talk through these kinds of things," for example, shared one of the teachers. A PYP coordinator, too, spoke to the importance of a coalition of coordinators across a state, province, territory, nation, or other wide geographical group, saying that "I couldn't do it without [name of group]." In reflecting on that regional association, this coordinator (similar to others in the study) shared that:

*It's so interesting organizationally, for me to think [about this], ... because nobody in that group is officially from IB .... That group is run entirely by coordinators who are trying to help each other understand their mother, their distant mother, who only communicates through releasing things through the internet and bringing evaluators to your school and running training.*

Interestingly, this IB coordinator did not initially recognize themselves as "officially from IB," though they were clearly part of a larger ecosystem of IB educators. A PYP head of school shared, too, that they saw the IB ecosystem as follows:

*... The mutually supportive ecosystem [fosters] being engaged as co-learners and instructors with my staff. I mean, to me, that is the most invaluable piece of IB. Our vision and mission as a school is so much more clear and bought into. You don't come here and interview as a teacher if you don't want to get on the IB boat. You know you're signing up to play with your team. You can't close your door and teach.*

For this head of school, along with all the IB educators we spoke with, they were a part of something bigger than their own schools, even if—as in the case of the IB coordinator described above—they did not perceive their involvement as *official*.

The educators in the European schools in our sample also spoke to the importance of networking with teachers and leaders at other IB schools. In some cases, school leaders recruited new teachers to their school based on interactions at IB professional development workshops. For one of the teachers in this study, a veteran educator with over 15 years' experience at IB schools in different regions decided to commit to another school mostly because of the IB coordinator who they met at a workshop. "She's a big reason why I came [to

the school],” reported this teacher. “[She] is really, really good at her job. She’s really, really strong and she gets it.” This teacher and IB coordinator, along with many of the IB educators in this study, appreciated the opportunity to lead workshops with other IB educators and to be on school visit authorization teams.<sup>12</sup> **The networking with other IB educators, they reported, was an essential aspect of their learning.**

### Commit to clear visions of ITL

Another way that IB educators deepen their learning about ITL practices is through conversations about and committing to shared visions of ITL. This pathway to learning is particularly evident at the schools that refer to aspects of ITL as “non-negotiable.” As one of the European PYP coordinators shared, for example, “everyone knows that we are an IB school and that these are non-negotiables.” This coordinator elaborated by reporting that, in their early years at the school, there was a team of teachers who had said to them, “well, I don’t care about central ideas.” To which the coordinator’s response was, “Well, it’s an IB school. You really should care.” This IB coordinator reported that they, along with the school’s entire leadership team, had been extremely purposeful during the past five years in both their hiring and teaming (or re-teaming) teachers. Other IB coordinators echoed this sentiment, though there was a noticeable difference in how often PYP coordinators brought up the importance of purposeful recruiting and teaming compared to other programmes’ coordinators, with the topic of recruitment and teaming arising only once with any of the MYP or DP educators (coordinators or teachers).

Across regions and programmes, it was evident that IB coordinators<sup>13</sup> played important roles in articulating visions for ITL and in facilitating learning opportunities for teachers (as well as heads of school and coordinators) across the school to understand, use, and refine ITL practices. At one PYP school, for example, the coordinator called themselves “the pedagogical leader in the building,” and in both individual interviews and focus groups, the teachers at that school offered multiple examples of ways in which the coordinator supported their professional learning. In some cases, the teachers appeared to not even be aware of how integral the IB coordinator was to a unit or Exhibition’s enactment. Instead, it was expected—a part of the fabric of the school—for the IB coordinator to be in a class, for example, modeling a mini-lesson on refining one’s questions toward a central idea or co-planning with them for the next unit.

Similarly, a PYP school leader shared that the coordinator was the person who ensured that ITL would be talked about in meetings, that teachers engaged in explicit aspects of ITL together and how ITL would be enacted in their classrooms. This PYP leader described the coordinator as follows:

*She is the person that drives [those discussions]. We meet weekly. I’m sure she’ll say I help with it, but if she weren’t here, I wouldn’t be able to have that level of conversation that we’re able to get to. ... She is the one who really dives deep. She dives deeply into the content from IB and the pieces, and makes it into activities and*

<sup>12</sup> These formal IBO-sponsored roles – Workshop Leader and Site Visitor/Evaluator - are the crux of the IB Educator Network (IBEN; see Chadwick et al., 2019), and educators with substantial experience in IB may apply for these opportunities.

<sup>13</sup> For more research on the importance of IB coordinators as “Middle Leaders” in IB schools, see Bryant et al. (2019).

*engagement that are digestible for staff, and always end up with work time and how you then incorporate this into your own work.*

Across schools and regions, IB educators in our study appreciated that they often relied on their coordinator's pedagogical expertise, and that coordinators shared expertise by offering advice, modeling in their class, co-planning, and reflecting on units, among other common interactions. As a PYP educator at another school shared:

*... especially in our reflection meetings when [the coordinator] is with us. He can ask some pretty hard questions and really get us thinking, and when I first came to [school], I was like, 'Oh my gosh, I don't know all the answers.' I would just be like, 'What if I say the wrong thing?' because I hadn't experienced having somebody in a role like that ask such thoughtful, provoking questions to make me really consider my teaching practices.*

Coordinators served as connectors. A PYP coordinator at a continuum school said, for example, "I think the best part of my job is that I'm the connector." This coordinator elaborated with examples of putting teachers in touch with each other, leading with specific questions or topics that are instrumental to ITL, and facilitating time for the teachers at the school to talk purposefully with one another and observe certain practices in action. These practices fit with the *IB Programme Standards and Practices* (IBO, 2019) call for collaborative planning time among school-based educators. "I haven't got all those tools myself," said this coordinator, "but I can see them. I see teams who are doing different things. I can connect the teams so that they can see really good inquiry-based instruction in practice." Especially in PYPs, educators spoke about ways that coordinators supported their learning. In DPs, however, there was more talk about coordinators needing to manage admissions processes<sup>14</sup> and external exams. This did not mean that DP coordinators were not helpful to their colleagues' learning, though it was notable how logistics played a larger role in DP interactions, as reported by educators we interviewed from that programme.

### **Refer to (and rely on) resources that clarify and support key principles of ITL**

IB educators across the continuum frequently spoke to seeking out resources that clarified and supported their learning in ways to enact ITL more successfully. As described above, many of the notable resources were other IB educators, followed by guiding documents that IBO published, as well as shared books and articles.

*IB Guiding Documents.* To help us determine what *the educators* deemed as important to their learning, we identified instances in the interviews when teachers and school leaders initiated and/or mentioned key IB documents. Though we asked about guiding documents that the organization's stakeholders referenced as important in the study (e.g., the *IB Learner Profile*), we were most interested in what the educators who are in schools each day mentioned as most important *to them*. Across the sample schools, the documents that IB educators mentioned as most important were the *Standards and Practices* document, with the PYP educators speaking more frequently and explicitly about it. DP educators, by contrast, spoke in more generalities about "standards and practices" and instead they referred more often to the subject guides

<sup>14</sup> IB does not have a formal policy on schools, DP or other programmes, having formal admissions policies; some IB-authorized programmes do and others do not.

of their particular discipline. Two other guidance documents that appeared important to PYP educators as evidenced by how often or explicitly they mentioned the documents were the “PYP Enhancements” document (*Transition Guide for the Primary Years Programme*; IBO, 2018) along with the PYP Unit Planner. One PYP coordinator also spoke explicitly about the importance—and support—of the documents that guide the 5-year evaluation cycle for authorized schools. Next, we illustrate ways in which the IB educators across the continuum referenced and spoke about using these key IBO documents.

*PYP Documents.* All PYP school leaders, including coordinators, referenced the new “PYP Enhancements” (*Transition Guide for the Primary Years Programme*) document, with the Swiss school engaging in its importance by using it for a book study among its staff. In the United States, perhaps because of the timing of the interviews and release of the Enhancements, the school leaders had not yet delved into its specifics. Instead, school leaders in the United States made general comments such, as “[IBO] is currently shifting documents.” Whereas by the time we were meeting with PYP educators in Europe, they were already engaging with the Enhancements as a full staff. One coordinator shared, “my role is to keep people within the framework of the PYP and to make sure we’re moving the practice forward, developing practice in line with, especially at the moment, the Enhancements.” This coordinator was using the Enhancements in a book study format with each grade-level team, reporting that they use the Enhancements to “push a goal”, and when there is a “strong team”, the coordinator can “push them a bit over and challenge them.” The coordinator elaborated, sharing that:

*We’re still kind of diving into the Enhancements. ... the teams can choose whether they work on the goal ... All teams have also chosen [a focus from the Enhancements], and what I ask the teams to do is identify at least one unit of inquiry, and possibly either a math unit or a language unit where they want to explore and reconsider something or look at some of the Enhancements, and that those are the ones I really target, and really approach it more from a coaching point of view, so how can we give more ownership ...*

One of the key ideas from this coordinator, that they wanted to focus on more as a school, is the intentional use of a term, “purposeful” in the Enhancements document. This coordinator reported that:

*There are some misconceptions as well with inquiry, not that [it’s] complete, free inquiry. I was reading the Enhancements and they’ve changed the word to guided inquiry. **The PYP used to use the term guided inquiry a lot, and they’ve switched it to this idea of purposeful inquiry. That for me is a real key, because I think a good, strong inquiry teacher, [they’re] absolutely very purposeful,** everything they do ... everything they put out in that environment, how they set up the environment is absolutely purposeful to support the learning, and sometimes explicit as well, being explicit with the children, where we are, what we’re doing, and why.*

This coordinator may indeed be one of the leaders, supported by the IB resources, to deepen and expand educators’ attention to purpose. An analysis of all the individual and groups interviews

with PYP educators and school leaders from a simple word search of the term “purposeful” (or “purpose” or other derivations) revealed that the PYP educators were not yet commonly using the term when speaking about ITL. Only one of the other 10 (10%) interviews with PYP educators included the term “purposeful”. Further research would be needed to explore the extent to which the use of that term had a bearing on whether teachers would indeed be more purposeful in their instruction and interactions with students. There are, after all, other terms with similar meanings (e.g., intentional). And what may be most important is teachers’ actual thinking and attention toward purpose in their instruction.

Educators may also adapt resources. The U.S. schools in this sample, for example, did not appear to be yet as collaboratively engaged with the new Enhancements document as the European school, but U.S. educators reported still referencing the IB documents, and appreciating what they felt as a recent move toward an ideal of teacher ownership in how they enacted the guiding principles in the documents. One school in particular reported being very proud of its adaptation of the IB Unit Planner. The head of school reported:

*A lot of what I would refer to is our planner. IB used to give us a planner to use, and now they’ve asked us to create our own planners. We’ve just adopted our new planner this year ... That’s what’s guiding teachers as they’re planning. That is the thing that gets used to create. There’s a box on there that says, ‘What’s your provocation to start your unit?’ Then there’s a rubric to rate yourself on how well you did with inquiry. When teachers are using that to plan, they are engaging with the IB. [The coordinator] actually has linked a bunch of the IB references right into the planner, so if you click on it, it pulls up this IB page. So, you see the IB language right there. That’s probably the biggest one that’s referenced.*

Teachers at this school also spoke to the usefulness of their school’s new planner. It had become a living document that embodies principles of the ITL that they viewed as important, especially in terms of connecting to student interests and ongoing reflection. Educators at the other U.S. PYP had also referenced their school’s planner as a way to keep their conversations with each other focused on transdisciplinary themes and lines of inquiry.

DP Documents. DP educators referenced their subject guides as important guidance documents, though they frequently spoke to the guides as incomplete in terms of supporting their learning in ITL. As one teacher reported, for example, the subject guide “discusses the role of inquiry in scientific discovery, which is great, but it provides no specific examples of inquiry-based lessons or units.” In the Physics subject guide, for instance, the term “inquiry” is used in relation to the MYP and TOK course, and not specifically to the subject matter or discipline of physics itself. This educator elaborated by sharing that:

*It says schools are responsible for building their own practical scheme of work with inquiry-based lessons and labs, not simply replicating steps in a lab. It’s ironic that the resources we are given include following steps in a lab.*

There is guidance in the document on the IA, what some DP educators called “the big project” as well as the one that is most aligned to ideals of ITL, yet in the words of this physics teacher, “I still found that a majority of the lessons in the example unit are more formulaic, following



specific sets instructions. There is some inquiry there and a couple of nice lessons, but not at the level I would expect.” Other DP educators shared similar sentiments, with one coordinator reporting that:

*They [IBO] have a guide for every class. I was looking at one earlier today to figure something out with a teacher. And **inquiry is in there, but if they really want it to be front and center, have it be in the first 5 pages and not 1, 2, or 3 paragraphs.** But here’s what it is, and as you look through the whole guide of your topic choices. Here’s how it fits in every single part. **Then, it will become very clear that that isn’t just a choice. It’s like we want you to do this and it should be this way.***

Overall, DP educators appreciated the guidance offered in the documents for the IAs, though each teacher spoke about unrealistic expectations in terms of time needed to reach the ideals of a quality IA. “Yeah, according to IB, the project is supposed to take 10 hours,” reported one Biology teacher in a focus group, for example, “and I haven’t known a single project that has been able to be completed in 10 hours.” A history teacher in the group responded, “Ten hours? It’s supposed to be 20, and I give them 30.” The teachers all nodded, with another summarizing the issue, “there’s a mismatch in time.” This mismatch of time recurred as a theme among all DP educators.

*Shared Books and Articles.* In speaking with IB educators about key resources for their learning, we also found that a text—Kath Murdoch’s *The Power of Inquiry*—is used across the Atlantic, in both one U.S. and one European school, to guide PYP instruction. PYP teachers used the text as a schoolwide book study, reading a chapter at a time with both discussion and time to practice a strategy or idea and then reflect collectively on what teachers chose to focus on and experiment with, as inspired by the Murdoch book. The participants spoke extremely positively about the text and the time to try new ideas out together, with some sharing, for instance:

*We were like, ‘This is our way into it. This is our way into really looking at what does inquiry mean?’ So, we took that on this year. So, this year, it’s been everything.... it’s dominated our collective conversations.*

According to the PYP educators who were reading the Murdoch text, the guidance in the book helped them shift their instructional practice. As a PYP coordinator in the United States explained, “we did a half day on the assets chapter, ... [including] reflecting on, what we’ve tried, how it’s gone, what worked and what didn’t so far.” The teachers, according to their coordinator, shared that the discussion, “gave [them] all a sense of what is happening” and that they realized they were not only “doing a lot” but that they were also “opening up what inquiry means.” In terms of a specific instructional practice the teachers were now using based on the book, an example was Split-Screen Objectives that they had read about together. “A lot of people are trying that out,” the coordinator reported, “In other words, emphasizing the skills and the concepts as much as the content, which is very NGSS [Next Generation Science Standards], right?” The NGSS are a set of K-12 science standards adopted by a large number of states in the United States in the last decade. By “very NGSS,” what this teacher is referring to is how those standards promote the notion that practices and skills should be taught in combination with

disciplinary core ideas and cross-cutting concepts, not separately (NGSS Lead States, 2013). We return to this idea in the recommendations (see p. 49).

Similarly, some of the PYP educators in Europe had participated in in-person workshops with author and educator Kath Murdoch and reported comments such as, “it was the best PD [professional development] because she met with the teams and planned with the teams.” The workshops were focused on ways in which students approach inquiry-based learning, with an emphasis on the skills that students would need for ITL. According to the participants, the workshops were also interactive, with Murdoch leading a lesson that participants watched and then leading a discussion.

The DP educators did not report engaging in a shared book or article about ITL (other than the IB subject area guides), though the DP coordinators and CAS coordinators referenced the IB Forum<sup>15</sup> as a resource that supported their learning about key ITL principles or practices. One of the CAS coordinators shared that they sought out information or tips from the online Forum (“MyIB”) about once a month when “there’s just nobody else in my vicinity to ask, nobody who has experience who is in my programme to ask.” DP and CAS coordinators spoke about the Forum in similar ways, sharing that they relied on it even more frequently when new to the IB ecosystem. In addition, these educators spoke about wanting or needing “a key” to make sense of all the different topics or resources on the Forum. A DP coordinator also pointed out that at IB-sponsored workshops a session would often end with a reminder about the online resources, but that there was not time to interact with it during the workshops themselves.

### Participate in learning opportunities that often vary by programme

All IB educators in this study reported that they appreciated and often learned from conversations with colleagues and other IB educators, yet we found that the opportunities to engage in collegial learning at the school often varied by programme. PYP schools seemed to have more time protected in their schedules, for instance, for collaborative planning and shared reflections of the Exhibition, a unit, and/or a lesson. DP educators reportedly had less frequent, structured time to share and reflect with each other about ITL. Instead, many DP educators relied on the informal times of getting together with colleagues, such as coffee breaks when, in one teacher’s words, they would, “sit together and talk about, like, ‘How did you do? How did you introduce this topic? Or do you have a good problem?’ ” Furthermore, as reported by the educators in this study, PYP meetings often had agenda items directly related to an IB principle or practice, whereas the meetings in DP schools appeared to be more general. As one DP coordinator stated, for example, “we have [IB-specific meetings] once a month. It’s usually tied to what’s the highlight this week or this month. What’s something you connected to another subject area or Theory of Knowledge? ... then, what were the outcomes you were seeing with kids or how did you get kids [engaged].” This finding on TOK aligns with that of Chatelier (2021). This did not mean, however, that DP educators were not deepening their learning about ITL. As another DP teacher had shared about their IB meetings, “I don’t know that we’re using the term student inquiry or inquiry-based instruction ... but I do think often that’s what we’re talking about.”

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<sup>15</sup> The IB Forum is an online private community for informal discussion among IB educators.

## Recommendations and Policy Considerations

The results of this study inform several recommendations and policy considerations for the IB and its stakeholders.

A key recommendation is that the organization and its stakeholders continue to seek ways to **assist teachers in becoming more well-informed and effective at inquiry-based teaching and learning (ITL)**. Teachers who are new to ITL or uncertain of how to implement this ambitious teaching model—whether they are new to the profession or veterans—need to be able to access resources and participate in activities that support their professional growth regarding ITL. IB could use two key outcomes of this study—the Organizational Theory of Change (Figure 3 and Appendix A) and the Instructional Theory of Change (Figure 4 and Appendix B)—as starting points for such activity. The organization and its stakeholders may **make use of these theories of change as resources and guides** for further discussion, elaboration, and refinement, informing future development of publications and professional development opportunities. Productive topics resources and programs may wish to focus on include what ITL is, what teaching strategies are key to implementing it as described in the Instructional Theory of Change, and how to design and implement coherent and flexible inquiry-based units of study. The IB should make sure to encourage continued strong focus on ITL in existing IB documents where they are already helpful (especially in PYP), make sure to integrate activities related to ITL and strategies of implementing it into activities of the IB Educator Network (IBEN; Chadwick et al., 2019), and make sure to offer relevant opportunities at IB-sponsored professional development (PD) workshops. At those workshops, an actionable suggestion from one focus group would be to structure time to integrate hands-on activities that make use of the burgeoning resources on ITL embedded in the “MyIB” online forum. In addition, the positive outcomes of local professional learning communities conducting **book studies**—such as with Kath Murdoch’s *The Power of Inquiry*—and **“lesson studies”** (Chokshi & Fernandez, 2004) on their own ITL instruction lead us to recommend more local and network-supported book and lesson study, whether through formal IB-sponsored workshops and its online Forum or through less formal yet still connected Associations of IB World Schools.<sup>16</sup> Recent research and practical development on local and networked “professional learning communities” (Stoll et al., 2006; Prenger et al., 2019; Scornavacca et al., 2021) could guide such work.

*Teachers who are new to ITL or uncertain of how to implement this ambitious teaching model need to be able to access resources and participate in activities that support their professional growth.*

Furthermore, Though not specifically a function of ITL, teachers interviewed for this study recommended that the organization offer more **flexibility in what “counts” toward the professional development requirements within authorized schools 5-year evaluation cycles**. Some of our study participants noted that some professional development

<sup>16</sup> For more information on Associations of IB World Schools, see <https://ibo.org/contact-the-ib/associations-of-ib-schools/>

opportunities that are not “approved” to count toward evaluation criteria, despite the fact that they provided valuable opportunities for improving teaching practices. In practical terms, IB educators may wish to appeal for a broader range of IB-sponsored events that they find valuable to count toward evaluation purposes.

Similarly, the IBO could build upon its connections with IB educator-led groups committed to their own and each other’s professional learning. Across the U.S. IB schools, for example, multiple participants spoke of the importance of their regional association to their professional learning, and just as Chadwick et al. (2019) pointed out in a study on the formal IBEN, the IB “could focus some resources on strengthening its networking components, including communication and collaborative structures” (p. vi). We started this study with a presupposition that IB educators were indeed a critical part of the IBO, yet learned that there is an organizational distinction between educators who are aware of and apply to be IB evaluators or workshop leaders (the IBEN, as described by Chadwick and colleagues) and those that form their own groups, which can reportedly be as influential (if not more) to educator learning and enactment of ITL. This helps explain why some IB educators did not speak of themselves directly as a part of the IBO; instead, as in the words of one PYP coordinator, the IBO was a “distant mother” and not necessarily an equal partner or collaborator in the complex work of supporting high-quality ITL; although only one coordinator directly used this terminology, several others across the continuum expressed ideas related to seeking more connection to the IB ecosystem. The IBO could learn more from the Associations and future research could explore the routines and communication structures of these influential groups. Most importantly, the IBO can continue to ask for educator input on ways to move forward as an inquiry-based, learning organization.

Lastly, we turn to recommendations for consideration in **IB-published documents**, which are an important resource for professional learning. The document analysis findings and interviews of school personnel results relating to IB documents are concretely actionable. Specifically, we found that the IB-published documents targeted at the PYP integrate far more explicit attention to inquiry than MYP documents, and DP documents have almost no explicit attention to inquiry. We recommend that the IB take a cue from its PYP documents, and when preparing revisions of existing documents or publishing new ones for MYP and especially DP, aim to **integrate more explicit attention to ITL strategies**. In addition, we recommend that the IBO consider mining the ideas and literature summarized in this document (see pp. 2-9 in Review of Academic Literature) to **stipulate discipline-specific inquiry learning goals, and particular disciplinary practices that are worth stressing** in documents such as subject guides. These include for example: in science, the practices specified in *the Framework for K-12 Science Education* (NRC, 2012) such as planning and carrying out investigations (not just following “cookbook” lab directions); in history, contextualizing historical events; in language arts, inquiring into the human condition as revealed by literature; and in mathematics, problem-posing and solving.

Our findings lead us to recommend that IB publications, IBEN-sponsored events and conferences, and locally organized professional learning community activities **openly address the tensions and tradeoffs of time, coverage, and external examination preparation** in the DP. We have indications from our interviews that this tension is widely recognized, and IB educators would welcome opportunities to collaboratively seek means to address it.

The topic of testing leads us to a policy consideration. We found that in the DP, “teaching to the test” is an issue that concerns IB educators, with virtually *all* DP teacher interviewees expressing or agreeing with a sentiment expressed by a peer in a focus group that the high-stakes exams limited how they saw themselves as able to practice ITL. We respect and recognize that DP exams are important and, in numerous ways, a valuable part of the IB history and culture, and they serve organizational aims of objectivity and reliability. Since the onset of the COVID-19 pandemic, the IBO has put more of a focus on portfolio-based external assessments and IAs based on extended inquiry work done **within courses** and less written external exams not integrated directly with classroom-based inquiry. We recommend that the organization consider the possibility that continuing such a trend could encourage a greater inquiry orientation in the DP. It is no coincidence that study participants noted the two external assessments—TOK assessments and EE— and IAs based on extended inquiry work done in courses as activities which supported ITL in the DP. Backward design of standards-oriented curriculum culminating in portfolio products intended for external assessment is possible, though obviously time-consuming; the IBO and local school leaders could consider supporting more work in this direction. At minimum, we recommend continuing the dialogue that commenced during the pandemic about these issues.

In addition, the IB could take up a suggestion directly from one of our interviewees of leaders: to conduct a **future literature review and/or study on “How can teachers facilitate students developing good inquiry questions?”** This includes how to select a topic of study that supports students in learning to be inquirers and ways to start units and lessons with effective provocations. A good question is both engaging and interesting to the learner, relevant to disciplinary learning, and helps propel future action. What role does the teacher play? What do productive dialogues between teacher and students look like? What structures and supports can be provided for students? Assembling the existing literature on these topics is beyond the scope of this study, but starting points include research and development on accountable talk in classrooms (e.g., Michaels et al., 2008), Wells’ (1999) dialogic inquiry, and recent work on ambitious science teaching (Windschitl et al., 2020).

*A good question is both engaging and interesting to the learner, relevant to disciplinary learning, and helps propel future action.*

Finally, the IB could consider pursuing research building on the Organizational and Instructional Theory of Change that was a key finding of this study. A future study could test the hypothesized relations between classroom actions in the Theory of Change—using structured observation protocols and/or teacher instructional logs—and the outcomes of engagement/interest; agency; risks, uncertainty and frustration; meaningful connection/life relevance; deep conceptual learning; and the posited relations of all of these variables to dispositions and skills for lifelong learning. It could be valuable to conduct a mixed methods study of qualitative cases in PYPs, MYPs, and DPs, along with quantitative studies using reliable assessment measures for the outcome constructs. In addition, similar or parallel organizational and teacher learning studies could be conducted based on the Organizational Theory of Change.



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## APPENDIX A: Exploratory Student Mindset Outcomes Study

By Joseph L. Polman, Karla Scornavacco, and Jessica Alzen

### Summary

The exploratory portion of this study involved responding to the following research questions:

- To what extent do attributes of IB students' thinking mindset change during an academic year?
- To what extent do attributes of IB students' thinking mindset differ by student or school characteristics?

We planned to administer the *Thinking Mindset Assessment* (TMA) in a pre-/post-design in 5 schools in the same 2 IB regions during the 2020-2021 school year. The TMA captures fundamental aspects of ITL consonant with the education literature and with IB schools' culture and the Organizational and Instructional Theory of Change developed and refined in the main study. The global COVID-19 pandemic negatively affected this exploratory portion of the study. Specifically, the pandemic reduced the number of schools able to participate, prevented the researchers from implementing planned on-site recruitment of participants and administration of surveys, and created more pressing needs for school administrators and families. As a result, out of a possible total of 830 surveys (two surveys for each of 415 students), we acquired only 121 surveys with both student assent and family consent for use in research—a 15% overall response rate. Due to the sparse dataset, we report descriptive results in this Appendix, and make suggestions for possible future research.

Our descriptive analysis of students' responses to the TMA shows that on average, students score within the desired score range, on each of the attributes: Learning Orientation, Creative Problem Solving, Cognitive Integrity, Mental Focus, and Scholarly Rigor (see Table A-1 on pp. 64-65 below). Encouragingly, the students in this study in a select few IB schools were able to maintain relatively high scores on a measure related to inquiry mindset, motivation, and student engagement amidst the pandemic, which is contrary to what research indicates about students generally (Black et al., 2021; Zaccoletti et al., 2020). We did not find notable changes in any attribute scores from fall to spring. We observed some descriptive differences by IB programme in learning orientation, scholarly rigor, and mental focus scores in this limited dataset, but we would need to conduct further studies to determine if there are enduring or larger-scale differences between these mindset outcomes across IB programmes. By and large, we observed a few differences in thinking mindset scores between student groups by sex, race, or region, and the few apparent differences are of minimal practical consequence; all of which are encouraging.



## Method

In this exploratory portion, we hoped to gain insight into the efficacy of IB programmes at producing expected and valuable student-level outcomes of inquiry-based instruction. The detailed research questions for this phase were as follows:

To what extent do attributes of IB students' thinking mindset—particularly learning orientation and creative problem solving—change during an academic year?

To what extent do attributes of IB students' thinking mindset—particularly learning orientation and creative problem solving—differ by student or school characteristics such as sex, race/ethnicity, year in school/IB programme (i.e., PYP, MYP, or DP), region of school (i.e., Europe or the United States)?

We identified a measure to assess expected and valuable student-level outcomes of inquiry-based instruction for administration in a pre-/post-design in the 2020-2021 school year. The education field does not yet have an optimal measure of inquiry dispositions and skills, and this is not a surprise given the multi-dimensionality underlying the concept of inquiry. Nonetheless, after careful review of the possible measures, we identified a measure that aligns well with fundamental aspects of inquiry and is suitable for use across multiple grade bands. This measure is *Thinking Mindset*, an assessment from Educate Insight of students' attributes of mental focus, learning orientation, creative problem-solving, cognitive integrity, and scholarly rigor (Insight Assessment, 2021). We examined all five attributes, with a focus on the Learning Orientation and Creative Problem-Solving constructs. TMA focuses on student dispositions toward inquiry, which can be applied across a variety of disciplinary contexts and situations. The measure supports research that relies on an assumption: effective ITL should result in students developing dispositions toward an inquiring stance or mindset, as well as the skills and knowledge of how to effectively enact that stance or mindset in a variety of situations. This measure enabled us to focus on the development of an inquiring stance or mindset. The survey was a practical measure for use in schools in that it required less than 15 minutes of class time, was easy to administer, and could be administered online or via paper-and-pencil. We used two of versions in our study: one designed for students in grades 3-5 and a second designed for students in grades 6-12. Insight Assessment (2021, pp. 50-55) provides evidence from several studies regarding the reliability of these assessments and the validity of inferences that can be drawn from data collected with them. The definitions of each attribute and qualitative descriptions of scores in each area as given in the user's manual are shown in Table A-1.

**Table A-1**

Descriptions of Five Attributes of Thinking Mindset Assessment (Insight Assessment, 2021, pp. 13-14)

|  |   |
|--|---|
| <b>Mental Focus<br/>(All Levels)</b>             | <p>Mental focus is the discipline or habit of being diligent, systematic, task-oriented, organized, and clear-headed.</p> <p>A positive score indicates a person who endeavors to stay on task and approach problems and learning in systematic, focused, organized, and timely way. Mental focus is valuable because it directs attention to the duties and responsibilities of the task at hand. An ambivalent or emerging score is characteristic of those who approach problems and decisions in an orderly, systematic, focused, and timely way on some occasions, but at other times do not. A negative or opposed score on Mental Focus is characteristic of individuals who are more haphazard in their thinking, disorganized, unfocused, or easily distracted.</p>  |
| <b>Learning Orientation<br/>(All Levels)</b>     | <p>The Learning Orientation scale measures the tendency or habit of seeking to increase one's knowledge and skills; toward valuing the learning process to accomplish mastery over a task; toward being interested in challenging activities; and toward using information seeking as a personal strategy when problem-solving.</p> <p>A positive score on Learning Orientation indicates inquisitiveness and a desire to learn things. Typically, this person wants to engage in learning activities, values gathering relevant evidence, and recognizes the importance of giving reasons to support opinions. An ambivalent or emerging score is characteristic of individuals who tend to have inconsistent attitudes toward learning or studying as ways to solve problems, acquire skills, or achieve goals. At times putting effort toward learning makes sense to them, but at other times not. A negative or opposed score on Learning Orientation indicates hostility or aversion to learning. These persons do not see studying or trying to learn something as a useful way to solve their problems or achieve their goals.</p>  |
| <b>Creative Problem-Solving<br/>(All Levels)</b> | <p>Creative Problem-Solving is the habit or tendency of approaching problem-solving with innovative or original ideas and solutions; toward feeling imaginative, ingenious, original and able to solve difficult problems; toward engaging in activities such as puzzles, games of strategy; and toward striving to understand the underlying function of objects.</p> <p>A positive score on Creative Problem-Solving indicates a person with intellectual curiosity, creativity, and a preference for challenging and complicated activities. Such a person may be seen as imaginative, innovative, adaptable, ingenious, or artistic. An ambivalent or emerging score is characteristic of individuals who occasionally seek to contribute imaginative, creative, or original ideas, but on other occasions are not inclined to do so. At times they may seek to understand how things work, and at other times they may prefer not to bother putting effort toward knowing the why or how of things. A negative or opposed score on Creative Problem-Solving indicates someone who habitually pulls away from trying to solve novel problems or contribute original thoughts. These persons have difficulty feeling imaginative, and they do not enjoy games or problem-solving situations that demand tactical and strategic adaptation.</p> |
| <b>Cognitive Integrity<br/>(All Levels)</b>      | <p>Cognitive integrity is the habit of interacting with differing viewpoints for the sake of learning the truth or reaching the best decision, it is the tendency to express strong intellectual curiosity and value fair-mindedness and sound reasoning.</p> <p>A positive score on Cognitive Integrity indicates someone who is motivated to use their thinking skills to solve problems, and who values courageous truth-seeking and open-mindedness even when dealing with complicated or difficult problems or issues. An ambivalent or emerging score is characteristic of people who are willing on occasion to let others express alternative ideas, but on other occasions are not so inclined. These individuals can be indifferent toward learning, apathetic or only mildly interested in discovering the truth in order to make decisions. A negative or opposed score on Cognitive Integrity is characteristic of individuals who exhibit closed-mindedness, intolerance toward the ideas or suggestions of others, bias, and desire not to learn new things or explore topics or ideas that might conflict with their preconceptions.</p>  |
| <b>Scholarly Rigor<br/>(Grades 3-12)</b>         | <p>Scholarly Rigor is the habit of working hard to engage and to correctly interpret new material. It is the tendency to put forth the mental effort to achieve a deeper understanding of complex or abstract ideas and information.</p> <p>A positive score on Scholarly Rigor indicates a person with the habit of putting forth effort to engage difficult material and to strive for deeper understanding. A person with this habit would not be put off by the need to read a difficult text or to analyze complicated situations or problems. An ambivalent or emerging score is characteristic of someone who occasionally is willing to put forth a serious scholarly effort, but on other occasions does not show that willingness or desire. Characteristically, this person may procrastinate rather than engage seriously in learning. A negative or opposed score on the Scholarly Rigor scale points toward the habitual tendency to avoid seeking new knowledge or examining new content in depth. This is characteristic of people who are inclined toward superficial interpretations and who avoid material that is complex or abstract.</p>  |

As a result of ongoing difficulties in school personnel coping with pandemic schooling crises, response rates were low and there was low adherence to the targeted fall and spring administration dates;<sup>17</sup> we aimed originally was for fall assessments to be administered in November 2020 and spring assessments in April 2021, but some schools continued to administer the first, “fall” survey through February 2021. Others administered the initial survey in November 2020. All participating schools administered the spring survey between May and June 2021. As a result, we do not have consistent data to paint a clear picture of any potential changes over time across schools. However, we have used the data to provide some descriptive information regarding students’ levels on these attributes overall during the 2020-2021 school year. We used Qualtrics® software (2021) to collect consents from families and students, the Insight Assessment (2021) website for collecting the student responses, and conducted analysis and graphics preparation in R (The R Foundation, n.d.).

The full population of interest in the study were those students enrolled in each of our target schools and grades during the 2020-2021 school year. Our research team asked representatives at the participating schools to email all students and family members with information about and access to the student assent/family consent forms. Additionally, we gave all students the opportunity to take the survey remotely once during each semester if their teachers administered the survey with the assurance that their data would not be included in research analysis if either the student or their family did not provide assent or consent, respectively. Table A-2 provides information regarding the target population at each school and response rates for student assents, family consents, and the survey, regardless of assent/consent status.<sup>18</sup> We saw wide variation in assent rates for students, consent rates for families, and survey response rates across schools and semesters. There does not appear to be a clear pattern in these rates between regions, grades, or schools other than the clear lack of assent/consent forms at Europe DP 1.

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<sup>17</sup> Originally, we planned to administer this survey at 8 different schools in 2020-21 ranging across PYP, MYP, and DP schools; half in Europe, and half in the United States. The same 8 schools where we conducted interviews all initially agreed to participate in the quantitative data-collection portion. It is necessary to note several changes and limitations introduced to this portion of our study due to the COVID-19 pandemic. The March 2020 onset of the COVID-19 pandemic forced us to modify our plans for securing informed consent and assent, and for data collection. In Summer 2020, we adjusted our Institutional Review Board protocols, and communicated with relevant school personnel about these adjustments. In the end, 3 schools (one in the U.S. and 2 in Europe) were not able to participate in the surveys due to the COVID-19 pandemic. We successfully administered the survey twice during the 2020-2021 school year at five different schools. Unfortunately, the COVID-19 pandemic caused us to lose physical access to schools, and we had to rely on school personnel to remotely manage collection of student assent, family consent, and administration of the remote survey.

<sup>18</sup> In social science research with human subjects, “assent” refers to permission provided by minors for participation in a research study, whereas “consent” refers to permission provided by adults. In the United States, where Institutional Review Board review for this study was obtained, individuals under the age of 18 are considered minors. In order to use data from a minor, we required obtaining both the assent of the minor and the consent of a parent or guardian.

**Table A-2**

Student Thinking Mindset Survey Full Raw Counts and Response Rates

| School                  | Grade | Enrollment | Student Assent<br>or Consent<br>(Count) | Family<br>Consent<br>(Count) | Fall Survey<br>(Count) <sup>19</sup> | Spring<br>Survey<br>(Count) |
|-------------------------|-------|------------|---|------------------------------|--------------------------------------|-----------------------------|
| USA PYP 1               | 4     | 68         | 87% (59)                                | 53% (36)                     | 79% (54)                             | 90% (61)                    |
| USA PYP 2               | 4     | 65         | 17% (11)                                | 35% (23)                     | 52% (34)                             | 54% (35)                    |
| USA DP 1                | 11    | 55         | 60% (33)                                | 64% (35)                     | 56% (31)                             | 62% (34)                    |
| Europe DP 1             | 11    | 19         | 0% (0)                                  | 0% (0)                       | 100% (19)                            | 74% (14)                    |
| Europe PYP-<br>MYP-DP 1 | 4     | 55         | 91% (50)                                | 67% (37)                     | 87% (48)                             | 91% (50)                    |
| Europe PYP-<br>MYP-DP 1 | 7     | 65         | 2% (1)                                  | 60% (39)                     | 52% (34)                             | 2% (1)                      |
| Europe PYP-<br>MYP-DP 1 | 11    | 88         | 13% (11)                                | 45% (40)                     | 91% (80)                             | 2% (2)                      |
| N                       |       | 415        | 40% (165)                               | 51% (210)                    | 72% (300)                            | 47% (197)                   |

After we removed survey data from students for whom we did not receive student assent and/or family consent, we were left with very sparse data—particularly at USA PYP 2, Europe DP 1, and Europe PYP-MYP-DP 1 grades 7 and 11 (See Table A-3).

**Table A-3**

Consented Counts and Survey Response Rates

| School              | Grade | Enrollment | Full Fall Data Count) | Full Spring Data (Count) |
|---------------------|-------|------------|-----------------------|--------------------------|
| USA PYP 1           | 4     | 68         | 41% (28)              | 41% (28)                 |
| USA PYP 2           | 4     | 65         | 2% (1)                | 2% (1)                   |
| USA DP 1            | 11    | 55         | 33% (18)              | 20% (11)                 |
| Europe DP 1         | 11    | 19         | 0% (0)                | 0% (0)                   |
| Europe PYP-MYP-DP 1 | 4     | 55         | 33% (18)              | 24% (13)                 |
| Europe PYP-MYP-DP 1 | 7     | 65         | 0% (0)                | 0% (0)                   |
| Europe PYP-MYP-DP 1 | 11    | 88         | 3% (3)                | 0% (0)                   |
| N                   |       | 415        | 16% (68)              | 13% (53)                 |

This exploratory aspect of the study suffers from low response rates (15%) due to challenges amidst the COVID-19 pandemic, as well as previously documented response rate issues with active consent procedures (Courser et al., 2009; Esbensen et al., 2008; Pokorny et al., 2001).

This prior research also documents common bias in samples collected in K-12 schools with active consent procedures. As a result, we do not assume that our data are representative of the full population of students from whom we attempted to collect data. This is surely a biased sample and one in which we are unable to characterize potential and perhaps various biases.

<sup>19</sup> According to Insight Assessment (2021), students who complete < 60% of the assessment and/or spend < 5 minutes on the assessment are not viable scores, so we excluded 18 survey responses from the initial dataset. Thus, all data and analysis provided here provide descriptive information rather than warrants for causal claims.

## Findings

Although our student thinking mindset data are sparse, they can provide some insight into what inquiry looks like for at least a small sample of students and how inquiry might differ amongst them. Before delving into these exploratory findings, it is important to understand more about the sample available for analysis. While we do not have sufficient data to uncover all differences among students, we can provide some basic information. In Table A-4, we show the percentages and counts for various student characteristics across semesters. We found little difference between semesters for most student characteristics (i.e., students at U.S. schools as opposed to European schools; females as opposed to males; white students as opposed to students of color), but we saw a small drop in responses from secondary students in the spring compared to the fall. We make no comparisons across individual schools due to the small sample sizes. Of the 4 schools that remain in the consented sample, only one included responses from more than 20 students. Instead, we make comparisons between groups that are slightly more robust, but it is important to remember that the full research sample includes only 121 survey responses across all sites and occasions.

### Overall Trends

We first summarize overall trends regarding the outcome of interest—the scores on the 5 attributes on the TMA, including Learning Orientation and Creative Problem Solving. In Table A-5, we report the means and standard deviations for these outcomes across all students and occasions for whom we have consented data. According to Insight Assessment (2021), the desired range of scores on the TMA are for scores in the “Somewhat Positive” or “Strongly Positive” range (i.e., scores ranging from 31–50 on a 0 – 50 scale). Thus, we see that **on average, students score within the desired score range, on each of the attributes.** This is encouraging as multiple reports indicate that the COVID-19 pandemic had negative impacts on K-12 students’ mental and emotional health as well as motivation for and engagement in school (Black et al., 2021; Zaccoletti et al., 2020). These results indicate that **at least the students in this study in a select few IB schools were able to maintain relatively high scores on a measure related to inquiry mindset, motivation, and student engagement amidst the pandemic.**

**Table A-4**  
Comparison Across Semesters—Consented Students

|               | Fall % (Count) | Spring % (Count) |
|---------------|----------------|------------------|
| United States | 69% (47)       | 75% (40)         |
| Secondary     | 31% (21)       | 21% (11)         |
| Female        | 49% (33)       | 47% (25)         |
| White         | 79% (54)       | 72% (38)         |
| N             | 68             | 53               |

**Table A-5**  
Average TMA Attribute Scores

|                          | Mean (SD)    |
|--------------------------|--------------|
| Learning Orientation     | 37.27 (7.13) |
| Creative Problem Solving | 33.26 (7.73) |
| Cognitive Integrity      | 38.67 (5.46) |
| Mental Focus             | 31.53 (7.92) |
| Scholarly Rigor          | 32.91 (5.29) |
| N                        | 121          |

There are several reasons to consider all further analysis as purely descriptive. First, we did not randomly select the schools. Second, within schools, we did not randomly select the students for whom we have usable data. Finally, there is no comparison group. As such, we offer the



following descriptions of the results but make no claims regarding causation behind any observed differences between student groups.

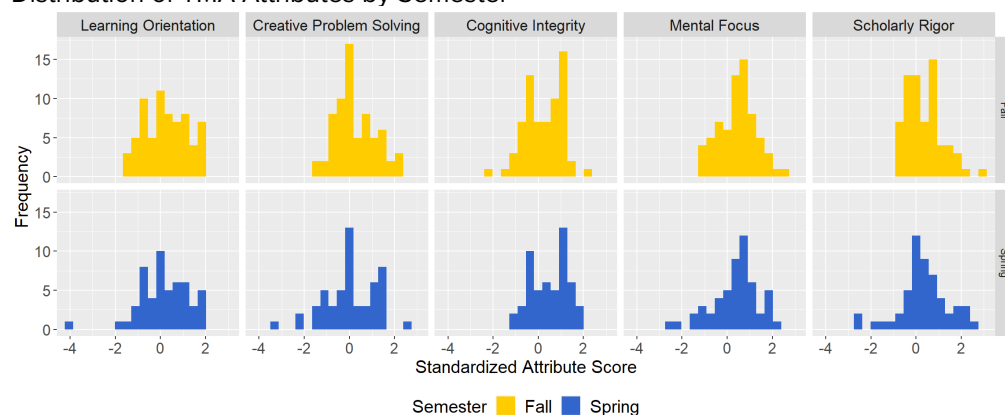
### To what extent do attributes of IB students' thinking mindset change during an academic year?

We first look at the distribution of scores for fall and spring for each of the five attributes of interest on the TMA. Overall, the students who completed the TMA assessment in the fall produced scores that are relatively similar to the scores of students who took the assessment in the spring. Additionally, students scored highly on each of the attributes on the TMA, on average. For the presentation of our findings in tabular and graphical form, the scores are standardized so that “0” indicates the mean score for each attribute as indicated in Table A-6. Negative scores are those below average and positive those above. In Table A-6 and Figure A-1, we show the results across the 2 survey administrations. Table 10 shows the means and standard deviations for each attribute at each time period, fall or spring; it also shows the *p*-value on a *t*-test of the difference between means for the fall group and spring group on each attribute. **We do not see significant differences in any attribute scores from fall to spring.**

**Table A-6**  
Standardized TMA Attribute Scores by Semester

|                          | Fall Mean (SD) | Spring Mean (SD) | p-value |
|--------------------------|----------------|------------------|---------|
| Learning Orientation     | 0.22 (0.94)    | 0.12 (1.09)      | 0.601   |
| Creative Problem Solving | 0.30 (0.87)    | 0.09 (1.15)      | 0.247   |
| Cognitive Integrity      | 0.25 (0.83)    | 0.51 (0.83)      | 0.090   |
| Mental Focus             | 0.42 (0.88)    | 0.31 (1.07)      | 0.519   |
| Scholarly Rigor          | 0.31 (0.79)    | 0.28 (1.05)      | 0.885   |
| N                        | 68             | 53               |         |

**Figure A-1**  
Distribution of TMA Attributes by Semester



Overall, there is no strong trend over time, so **there is no indication that the experiences of the respondents over this period—either in school with inquiry-oriented activities or otherwise—have led to changes in mindset.** This includes the learning orientation mindset and the creative problem-solving mindset that we posit could be impacted by strong ITL. This may have been the case in any other year, or with a larger data corpus, but we do not know. Conversely, this is more **evidence to potentially suggest that this small sample in these select IB schools were able to maintain healthy attitudes toward school during the COVID-19 pandemic, which contradicts what research indicates about students generally** (Black et al., 2021; Zaccoletti et al., 2020). While this does not provide causal evidence of the influence of IB programmes on students' disposition during the pandemic, the results are encouraging.

### To what extent do attributes of IB students' thinking mindset differ by characteristics such as IB programme level, region of school, or student sex or race?

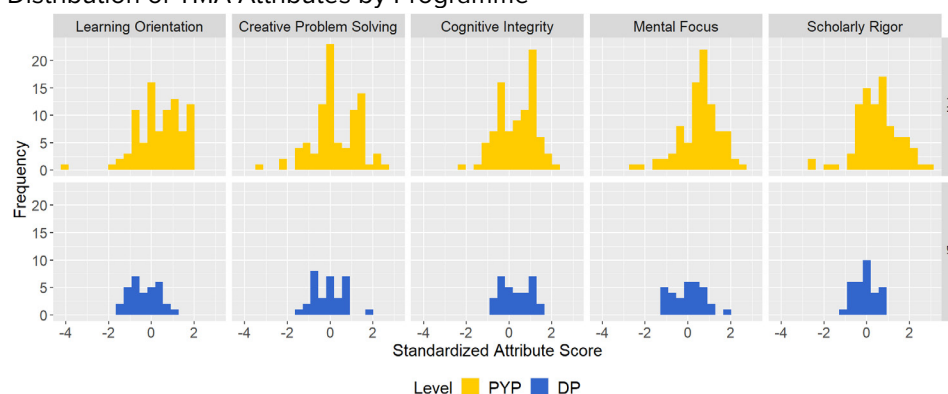
Although we do not have adequate samples to make comparisons across schools, we can make comparisons between **programmes**. There is viable data from 4th-grade classrooms (3) and 11th-grade classrooms (2). Again, we do see an imbalance in the samples as there are considerably more responses from PYP students than from DP students (See Table A-7). Again, there is notable overlap in the TMA scores between groups (see Figure A-2). However, DP students did have statistically significantly lower scores on Learning Orientation, Mental Focus, and Scholarly Rigor of a magnitude of about half a standard deviation. These differences amount to about 2-4 points lower on the 3 constructs, all of which remain above the cutoff of 31 points except for Mental Focus. The average score for Mental Focus across DP students is about 28, which is just under the Insight Assessment cutoff. However, recall that these scores come from about 30 surveys at 2 high schools from a non-randomized sample. It is possible that the pattern of this result was due to the small sample size, due to pandemic circumstances landing differently on schoolchildren at the different programmes, or due to enduring systematic differences in PYP and DP schooling. **More investigation is needed to determine if there are enduring or larger-scale differences between these mindset outcomes across IB programmes.**

**Table A-7**  
Standardized TMA Attribute Scores by Programme

|                          | PYP Mean (SD) | DP Mean (SD) | p-value |
|--------------------------|---------------|--------------|---------|
| Learning Orientation     | 0.36 (1.05)   | -0.31 (0.65) | 0.001   |
| Creative Problem Solving | 0.30 (1.09)   | -0.04 (0.69) | 0.096   |
| Cognitive Integrity      | 0.37 (0.88)   | 0.34 (0.69)  | 0.868   |
| Mental Focus             | 0.53 (0.98)   | -0.06 (0.80) | 0.002   |
| Scholarly Rigor          | 0.44 (0.96)   | -0.11 (0.57) | 0.003   |
| N                        | 89            | 32           |         |

**Figure A-2**

Distribution of TMA Attributes by Programme



We next consider differences in **region**. The sample contains information from three U.S. schools and one European school. The imbalance in the samples is evident by the larger blue areas in the histograms in the bottom row of Figure A-3 than the yellow histograms in the top row. Also notable is that there is almost complete overlap between the European (yellow) and U.S. (blue) schools. **The only notable difference in groups is in Cognitive Integrity.** The average for students in European schools is about half a standard deviation lower than the average among students in U.S. schools. While this is a statistically significant difference (See Table A-8); the **practical difference is negligible** at about 3 points on the TMA. Overall, both students in European and U.S. schools scored in the desired range for Cognitive Integrity on the TMA.

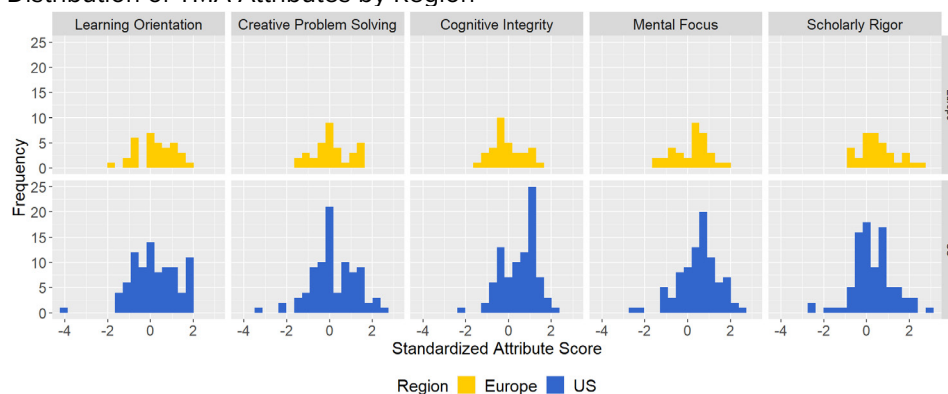
**Table A-8**

Standardized TMA Attribute Scores by Region

|                          | Europe Mean (SD) | U.S. Mean (SD) | <i>p</i> -value |
|--------------------------|------------------|----------------|-----------------|
| Learning Orientation     | 0.21 (0.88)      | 0.16 (1.05)    | 0.806           |
| Creative Problem Solving | 0.13 (0.90)      | 0.24 (1.05)    | 0.567           |
| Cognitive Integrity      | -0.05 (0.73)     | 0.52 (0.82)    | 0.001           |
| Mental Focus             | 0.11 (0.84)      | 0.48 (1.00)    | 0.062           |
| Scholarly Rigor          | 0.44 (0.86)      | 0.24 (0.92)    | 0.284           |
| <i>N</i>                 | 34               | 87             |                 |

**Figure A-3**

Distribution of TMA Attributes by Region



We next turn to differences by **sex**. The sample is relatively balanced between male and female students, and we once again see quite a bit of overlap in the distributions of TMA scores in Figure A-4. **There are no statistically significant differences in the mean scores on any construct across male and female students** (See Table A-9). Since we do not expect to see any differences due to sex, these are encouraging data.

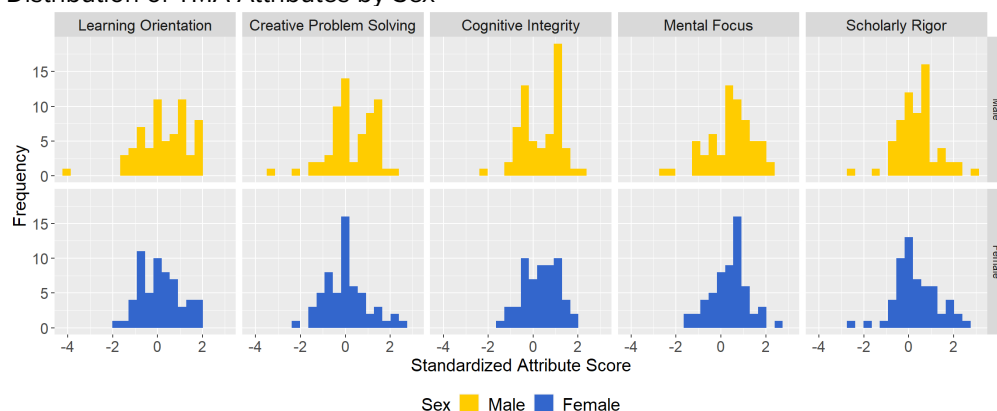
**Table A-9**

Standardized TMA Attribute Scores by Sex

|                          | Male Mean (SD) | Female Mean (SD) | p-value |
|--------------------------|----------------|------------------|---------|
| Learning Orientation     | 0.25 (1.11)    | 0.10 (0.88)      | 0.419   |
| Creative Problem Solving | 0.34 (1.04)    | 0.07 (0.96)      | 0.130   |
| Cognitive Integrity      | 0.37 (0.89)    | 0.36 (0.78)      | 0.952   |
| Mental Focus             | 0.40 (1.06)    | 0.34 (0.85)      | 0.755   |
| Scholarly Rigor          | 0.32 (0.87)    | 0.27 (0.95)      | 0.739   |
| N                        | 63             | 58               |         |

**Figure A-4**

Distribution of TMA Attributes by Sex



Our analysis of differences by **race** is constrained by the fact that there are only about 30 responses from students of color as opposed to over 90 responses from students who identify as white. This is evident in the relatively larger blue areas in the bottom row of Figure A-5 showing white students. As before, there is substantial overlap between the two groups. There are **statistically significant differences between the two groups for Creative Problem Solving and Scholarly Rigor of just under half a standard deviation** (See Table A-10). **White students score slightly lower** on these two attributes than students of color, but both groups retain average scores above the desired score range. Since this study spans schools across continents and issues of race and class, though not totally disparate, are not commensurable across contexts, **differences in race should particularly be taken with caution**. The different contexts of the schools in this study, in addition to the limitations of the sample size and a surely biased sample, make it impossible to make strong claims regarding differential experiences for students of different racial backgrounds.

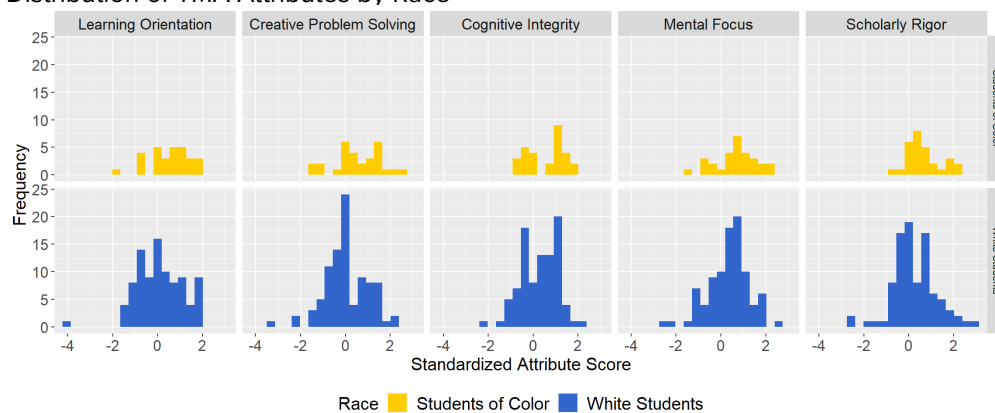
**Table A-10**

Standardized TMA Attribute Scores by Race

|                          | Students of Color<br>Mean (SD) | White Students<br>Mean (SD) | p-value |
|--------------------------|--------------------------------|-----------------------------|---------|
| Learning Orientation     | 0.48 (0.87)                    | 0.08 (1.03)                 | 0.063   |
| Creative Problem Solving | 0.56 (1.05)                    | 0.10 (0.97)                 | 0.032   |
| Cognitive Integrity      | 0.61 (0.84)                    | 0.29 (0.82)                 | 0.069   |
| Mental Focus             | 0.64 (0.99)                    | 0.29 (0.95)                 | 0.092   |
| Scholarly Rigor          | 0.59 (0.75)                    | 0.20 (0.94)                 | 0.045   |
| N                        | 29                             | 92                          |         |

**Figure A-5**

Distribution of TMA Attributes by Race



As previously noted, the results are particularly limited by some aspects of our initial design, but mostly by the COVID-19 pandemic conditions resulting in both a very small sample size and questions about how to theorize and explain the few patterns which emerged. Despite valiant efforts on the part of many individuals to collect a robust sample for analysis in this study, the active consent process and complications related to COVID-19 severely limited our ability to collect a representative sample. The descriptive results presented here suggest that, **by and large, there are few differences in thinking mindset scores between student groups and the few apparent differences are of minimal practical significance.** Some results suggest potentially encouraging information regarding IB—particularly the possibility of IB schooling helping to keep students engaged and motivated during a global pandemic. Other **results suggest some potential areas related to aspirational inquiry-oriented outcomes that may require further investigation—such as Learning Orientation for DP students.** Despite these minor differences, we are also **encouraged by the lack of evidence suggesting any differences between student groups by sex, race, or region, which is what we hope for** in a study design such as this—one without a control group and with an intent for *all* subgroups in the population to benefit from ITL.



## APPENDIX B: Organizational Theory of Change

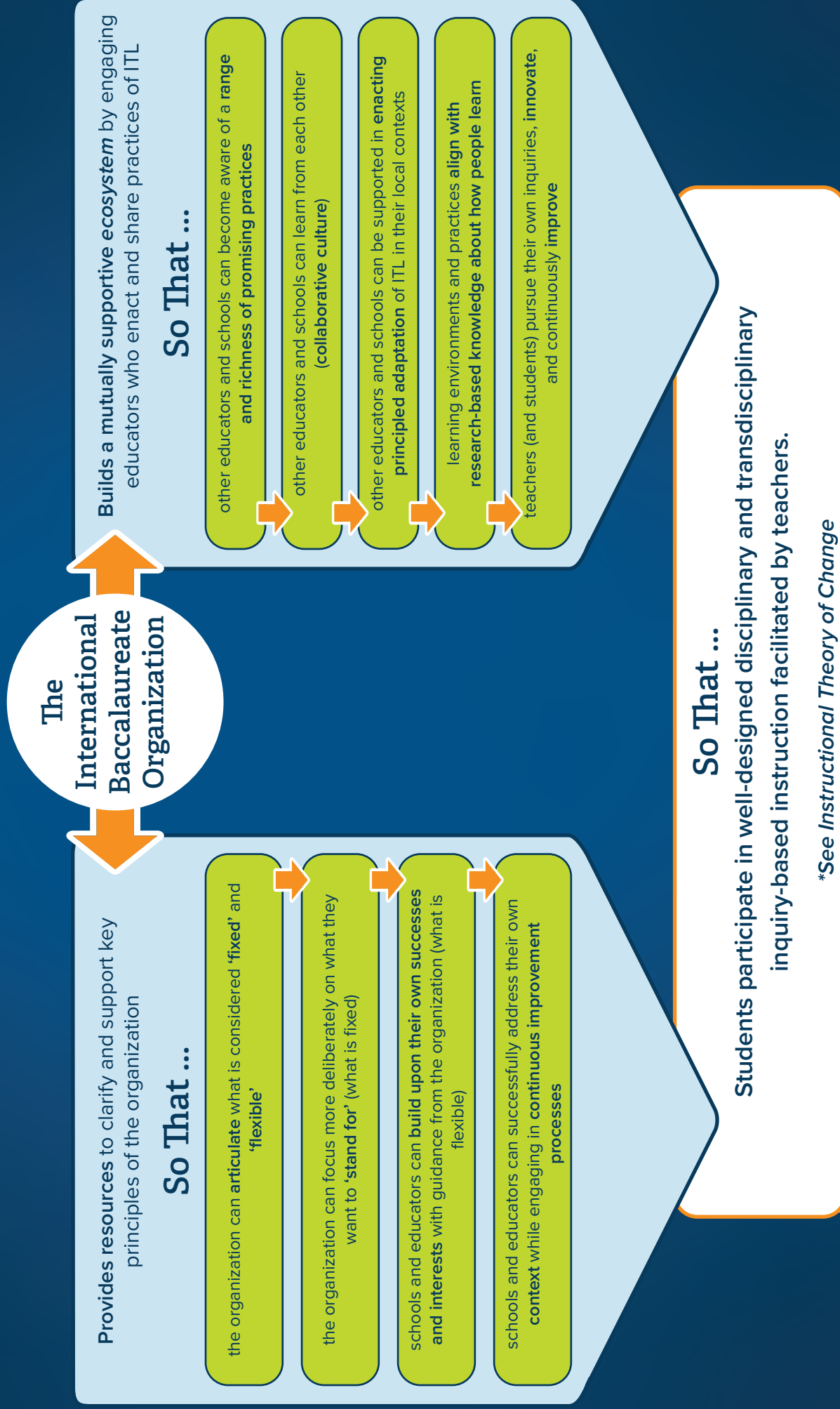
# INQUIRY-BASED TEACHING AND LEARNING

## ORGANIZATIONAL THEORY OF CHANGE

### Goals

Engaged students, critical thinkers and problem-solvers, and life-long learners.

Students develop the dispositions and skills to pursue meaningful questions that are not only interesting to them and others, but that also lead to a better, more peaceful world.



## APPENDIX C: Instructional Theory of Change

# INQUIRY-BASED TEACHING AND LEARNING

## INSTRUCTIONAL THEORY OF CHANGE

### Goals

Engaged students, critical thinkers and problem-solvers, and life-long learners

Students develop the dispositions and skills to pursue meaningful questions that are not only interesting to them and others, but that also lead to a better, more peaceful world.

### \*Classroom Actions

Students participate in well-designed disciplinary and transdisciplinary inquiry-based instruction facilitated by teachers.

- **listen** deeply to students and help them connect their interests with disciplinary ideas
- **pose questions, interact** with students, and provide **feedback** to help students to think deeply and refine their inquiries
- provide **strategic supports** for practice-based and conceptual understanding
- support students in **learning to collaborate**
- ensure that the **classroom environment** allows for physical movement and dialogue between students
- demonstrate they **care** for and about their students
- foster a **learning community** in which students care for, listen to, and support one another

Teachers ...

Students ...

### So That Students ...

- are **engaged** and **interested** in their learning
- exercise **agency** through voice, choice, and ownership
- take **risks** and cope with **uncertainty** and **frustration**
- **deeply learn** concepts and practices across the disciplines
- feel satisfaction about what they have learned and accomplished, and see it as **meaningfully** connected to their lives outside school, their community, and the world



So That ...

Students develop dispositions, knowledge, and skills for lifelong learning

Students contribute to a better, more peaceful world.

## APPENDIX D: Key Stakeholder Interview Protocol (Research Instrument)

The purpose of this conversation is to learn about your perspective on inquiry-based teaching and learning within the International Baccalaureate Organization (IBO) and schools IBO authorizes. We are trying to understand the range of perspectives and experiences with this concept of inquiry and associated practices, so we can understand how it operates within International Baccalaureate (IB) schools. Therefore, we are interested in both your personal perspective and your perspective on how others within the organization and schools see things. Your responses are confidential and will not be attributed to you personally.

o. Is it ok if I record this interview?

- If YES, start recording and
- state the date
  - name of interviewer
  - name of interviewee

### Context

1. In what ways have you been involved in supporting inquiry-based teaching in IB schools?

### Understandings

2. What does “inquiry-based teaching and learning” mean to you personally?
3. What practices would you expect to see in an inquiry-based classroom? What would a classroom practicing inquiry look like?
4. What about how people learn do you think makes inquiry-based learning a good idea when it goes well? What about how people learn makes inquiry-based learning difficult?
5. Are there any other key ideas or trends in educational research and curriculum that are important to your ideas about “inquiry-based teaching and learning”?

If so, what are they?

6. We are interested in educators’ perspectives on the key *outcomes of* “inquiry-based teaching and learning.”
- Why engage in this approach to instruction?
  - What do you consider the key outcomes of successful “inquiry-based teaching and learning?”
  - Which key outcomes to “inquiry-based teaching and learning” do you feel the IBO, as a whole, attends to most closely?
    - Why? What leads you to conclude this?



## IB & Inquiry

7. What do you think are the range of understandings of “inquiry-based teaching and learning” in IB schools?

- If there is any general consensus on what practices are expected in inquiry, how would you describe it?
- Imagine a spectrum from “high-inquiry” to “low-inquiry”
- What would a “high-inquiry” school and classroom look like?
- What would a “low-inquiry” school and classroom look like?
- Do you see differences in how inquiry is conceptualized and practiced in PYP, MYP, and DP schools? Please describe the similarities and differences. Why do those differences exist?

8. What have you noticed is most helpful for teachers in learning to support student inquiry in their classrooms?

- What are the biggest challenges?
- What have you noticed that the IBO has done most successfully in supporting teachers in this area?

9. What do you believe schools as learning organizations need to be effective at supporting inquiry?

## IB’s Guiding Documents

10. What IB documents do you see as key for understanding the meaning and goals of “inquiry-based teaching and learning”?

**We’ve started to look at some IB guiding documents and want your insights on what we’ve started to notice.**

11. [If time] We are noticing a trend of more attention to inquiry-based teaching and learning at the primary level. Would you say that is consistent with your experiences with IB? Is there anything you’d like to add to what you said before [in response to #6]

12. The IB learner profile is described as the IBO’s “mission statement in action.” It says, and I’d like to read from it that, “as IB learners we strive to be ‘Inquirers.’” According to this document, being “Inquirers” is described as follows:

“We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life.”

- Please describe to us what this means to you.
- In your view, how is this idea expected to be brought to life in schools?
- To your knowledge, how is this aspect of the “learner profile” used in schools?

13. Is there anyone else you suggest we speak with about these issues?

14. The last question is, do you have anything else to add or to tell me?

# APPENDIX E: Teacher Focus Group Interview Protocol (Research Instrument)

The purpose of this conversation is to learn about your perspective on inquiry-based teaching and learning within your IB school. We are trying to understand the range of perspectives and experiences with this concept and associated practices, so we can understand how it operates within IB schools. Therefore, we are interested in both your personal perspective, and your perspective on how others within the school and organization see things. Your responses are confidential, and will not be attributed to you personally.

## *Norms for this Focus Group:*

- One person should speak at a time.
- There are no “wrong” answers to any of these questions. We are interested in hearing your perspectives as \_\_\_\_\_(e.g., 4th grade teachers)
- Everyone will have a chance to speak. If you have not had an opportunity to provide your perspective, I may call on you.
- Please turn off or silence your cell phones.
- Are there additional norms the group would like to add?

## *Note-taking and audio recording:*

- Inform participants that someone will be taking notes to make sure that researchers get all of your feedback (facilitator or co-researcher).
- Ask permission to audio record

## Reminders & Logistics

| Materials  | Facilitator Role   |
|--|--|
| 1. Focus Group List of Participants<br>2. Focus Group Protocol/Script<br>3. Nametags<br>4. Audio Recorder<br>5. Computer/Notebook (notetaker)<br>6. Watch or Clock<br>7. Opening question on Chart Paper | <ul style="list-style-type: none"><li>• Set a positive tone.</li><li>• Make sure everyone is heard; draw out quieter group members.</li><li>• Probe for more complete answers.</li><li>• Monitor questions and the time closely.</li><li>• Thank participants and tell them what your next steps are with the information.</li></ul> |

*Note: italicized questions are optional if they’ve already covered them.*

o. Is it ok if I record this interview?

If YES, start recording and

- state the date
- name of interviewer
- name of interviewees

## Introduction

Let's start with brief introductions.

- What do you teach at the school?
- How long have you been in your current role?
- How long have you been in education?

Now, we'll get into the questions.

## Context

1. In what ways do you feel that inquiry-based teaching and learning aligns with the culture of your school, or does not align?
2. How often does student inquiry get talked about in your meetings? In what ways?

## Understandings

3. Is there any general consensus on what practices of inquiry are expected at your school? If so, how would you describe the consensus?
  - What practices would you expect to see in an inquiry-based classroom?
4. Overall, what do you consider the key outcomes of successful "inquiry based teaching and learning?"
  - Why engage in this approach to instruction?
5. What are the biggest challenges, limitations, or tradeoffs in implementing inquiry-based teaching and learning?
  - ... *For teachers such as yourselves: What do you feel more and less comfortable with in supporting student inquiry?*
  - ... *For students*
  - ... *For administrators*
6. What are the biggest rewards in implementing inquiry-based teaching and learning?
  - ... *For students*
  - ... *For teachers such as yourselves*
  - .... *For administrators*

7. How, if at all, are you supported as professionals who foster inquiry? What professional learning experiences have been more or less useful?

- Are any of the ways you are supported at fostering inquiry provided by the IB organization?

8. The IB Learner Profile is described as the IBO's "mission statement in action." It says, "as IB learners we strive to be 'Inquirers.'" Being "inquirers" is described as follows: "We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life."

- How, if at all, is this aspect of the "learner profile" used in your school?

9. [Show them the draft Theory of Change]. Here is a draft of the "theory of change" we've put together regarding inquiry-based teaching and learning. This is based on both general practices in education and specific IBO documents and practices as we understand them. [Describe it in brief].

- What, if anything, do you see as positive aspects, that seem right, about this?
- What, if anything, do you see as aspects that are not quite right?

10. [if time] What differences, if any, do you see in what inquiry means at different levels and in different subjects?

11. [if time] Are there any inquiry-based units that you or your school are particularly proud of? Success stories?

12. [if time] Are there any key ideas or trends in educational research and curriculum that are important to your ideas about "inquiry-based teaching and learning"?

If so, what are they?

13. **The last question** is, do you have anything else to add or to tell me?

## APPENDIX F: Teacher Individual Interview Protocol (Research Instrument)

The purpose of this conversation is to learn about your perspective on inquiry-based teaching and learning within your International Baccalaureate (IB) school. We are trying to understand the range of perspectives and experiences with this concept and associated practices, so we can understand how it operates within IB schools. Therefore, we are interested in both your personal perspective, and your perspective on how others within the school and organization see things. Your responses are confidential and will not be attributed to you personally.

*Note: italicized questions are optional if they've already covered them.*

o. Is it ok if I record this interview?

If YES, start recording and

- state the date
- name of interviewer
- name of interviewee

### Introduction

1. [confirm what teaches at the school]. How long have you been in your current role? How long have you been in education?

### Context

2. *[Ask if not a participant in a focus group. Or, if needed, ask the teacher to clarify.]* In what ways do you feel that inquiry-based teaching and learning aligns with the culture of your school or not ?

3. How often does student inquiry get talked about in your meetings? In what ways?

### Understandings

4. What does “inquiry-based teaching and learning” mean to you personally?

- What practices would you expect to see in an inquiry-based classroom?
- Imagine a spectrum from “high-inquiry” to “low-inquiry”.
  - What would a “high-inquiry” school and classroom look like?
  - What would a “low-inquiry” school and classroom look like?

5. [For teachers not in focus group or, if needed, to clarify what already shared in focus group] We are interested in educators’ perspectives on the key *outcomes of* “inquiry-based teaching and learning.”

- Why engage in this approach to instruction?
- What do you consider the key outcomes of successful “inquiry-based teaching and learning?”



## Practices

6. Can you tell us an “inquiry” success story?

- Step through detail of at least one success story.
- What made it particularly successful in your mind?

7. Can you describe some other inquiry-based units for us, in broad strokes? What do you hope for in each of these?

8. What do you consider the biggest challenges, limitations, or tradeoffs in implementing inquiry-based teaching and learning? How do you cope with these?

- ... *For teachers such as yourself: What do you feel more and less comfortable with in supporting student inquiry?*
- ... *For your students?*
- ... *For administrators?*
- *[probe/look-for] Some people think it's better to teach “content” first, then have students do inquiry. Others say it's more effective to “inquire to learn content.” Which do you subscribe to, and why? If your answer is, “it depends”, what does it depend on?*

9. What do you consider the biggest rewards in implementing inquiry-based teaching and learning?

- ... *For your students?*
- ... *For teachers such as yourself?*
- .... *For administrators?*

10. Are there any routines or instructional practices you feel are helpful to engage in each day (or nearly every day) to foster student inquiry?

- How often do you engage in these practices? Why or why not?

11. What differences, if any, do you see in what inquiry means and how it is practiced

... [if elementary]: in different disciplines?

... [if secondary]: in the discipline[s] you teach as compared to other disciplines?

## If time, especially if they were not in a focus group

12. [Show them the draft Theory of Change]. Here is a draft of the theory of change we've put together regarding inquiry-based teaching and learning. This is based on both general practices in education and specific IB documents and practices as we understand them. [Describe it in brief].

- What, if anything, do you see as positive aspects - that seem right - about this? What, if anything, do you see as aspects that are not quite right?

13. How, if at all, have you been supported as a professional who fosters inquiry?

- What professional learning experiences have been more or less useful to you?
- Are any of the ways you are supported at fostering inquiry provided by the IB organization?

14. The IB learner profile is described as the IBO's "mission statement in action." It says, "as IB learners we strive to be 'Inquirers.'" Being "Inquirers" is described as follows: "We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life."

- Can you elaborate on how this aspect of the learner profile affects your practice, if at all?

15. [if time] What differences, if any, do you see in what inquiry means in different programmes (PYP, MYP, DP)?

16. [if time] Are there any key ideas or trends in educational research and curriculum that are important to your ideas about "inquiry-based teaching and learning"?

If so, what are they?

**17. The last question** is, do you have anything else to add or to tell me?

## APPENDIX G: School Leader Individual Interview Protocol (Research Instrument)

The purpose of this conversation is to learn about your perspective on inquiry-based teaching and learning within your International Baccalaureate (IB) school and the International Baccalaureate Organization (IBO). We are trying to understand the range of perspectives and experiences with this concept and associated practices, so we can understand how it operates within IB schools. Therefore, we are interested in both your personal perspective and your perspective on how others within the school and the organization see things. Your responses are confidential and will not be attributed to you personally.

*Note: italicized questions are optional if they've already covered them.*

o. Is it ok if I record this interview?

If YES, start recording and

- state the date
- name of interviewer
- name of interviewee

### Context

1. Can you tell me a little bit more about your role and your main responsibilities as [an IB coordinator/head of school/assistant head of school/leader]?

- How long have you been in this role?

2. In your role, how do you see yourself supporting inquiry-based teaching and learning in your school? [supporting teachers, and supporting students]

3. How does “student inquiry” fit into your highest-level school priorities?

4. In what ways do you feel that inquiry-based teaching and learning aligns with the culture of your school or not?

5. How often does student inquiry get talked about in your meetings? In what ways?

### Understandings

6. What does “inquiry-based teaching and learning” mean to you personally?

7. What practices would you expect to see in an inquiry-based classroom? What would a classroom practicing inquiry look like? In other words, what are your “look-fors”?

8. What about how people learn do you think makes inquiry-based learning a good idea when it goes well? What about how people learn makes inquiry-based learning difficult?

9. Are there any other key ideas or trends in educational research and curriculum that are important to your ideas about “inquiry-based teaching and learning”?

If so, what are they?

10. Overall, what do you consider the key outcomes of successful “inquiry-based teaching and learning?”

- Why engage in this approach to instruction?

## IB & Inquiry

11. What do you think are the range of understandings of “inquiry-based teaching and learning” in your school?

- If there is any general consensus on what practices are expected in inquiry, how would you describe it?
- Imagine a spectrum from “high-inquiry” to “low-inquiry”
  - What would a “high-inquiry” school and classroom look like?
  - What would a “low-inquiry” school and classroom look like?

12. Can you tell us an “inquiry” success story?

13. What are the biggest challenges, limitations, or tradeoffs in implementing inquiry-based teaching and learning?

- ... *For students?*
- ... *For teachers?*
- ... *For yourself and other administrators in schools?*

14. What are the biggest rewards in implementing inquiry-based teaching and learning?

- ... *For students?*
- ... *For teachers?*
- .... *For yourself and other administrators in schools?*

15. What have you noticed is most helpful for teachers in learning to support student inquiry in their classrooms?

16. How does the IBO support you and your teachers at fostering inquiry-based teaching and learning?

## IB’s Guiding Documents

17. What IB documents do you see as key for understanding the meaning of “inquiry-based teaching and learning”

We've started to look at some IB guiding documents and want your insights on what we've started to notice.

18. We are noticing a trend of more attention to inquiry-based teaching and learning at the primary level. Would you say that is consistent with your experiences with IB?

19. The IB learner profile is described as the IBO's "mission statement in action." It says, "as IB learners we strive to be 'Inquirers.' " Being "Inquirers" is described as follows: "We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life."

- Can you describe what this means to you?
- In your view, how is this idea expected to be brought to life in IB schools? How, if at all, is this aspect of the "learner profile" used in your school?

**20. The last question** is, do you have anything else to add or to tell me?





University of Colorado  
Boulder



March 2022