Student Reflection:
A Study of "Reflective"
in the IB Diploma Programme

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Executive Summary

The International Baccalaureate (IB) was founded in 1968 as an educational program provider for geographically mobile students enrolled at international schools. Its programs have grown significantly over the past 10 years and today are provided to well over a million students and 4267 schools in 147 countries, and the IB diploma is accepted worldwide as a gateway for entrance into the best and most rigorous universities (Burris, Welner, Wiley, & Murphy, 2007; Hill, 2012). The IB curriculum is offered through four IB programs: the Primary Years Programme (PYP), the Middle Years Program (MYP), the Diploma Programme (DP), and the Career-Related Programme (CP). All IB programs encourage academic and personal achievement, inspiring students to excel in their studies and in their personal growth (International Baccalaureate Organization [IBO], 2015a).

IB programmes, including the DP, support student attainment of a range of 10 academic and non-academic attributes that are collectively described as the Learner Profile (IBO, 2015d). The Learner Profile represents targets and values that become part of a school's culture and ethos when the institution is authorized as an IB World School. At the student level, the attributes and descriptors of the Learner Profile define the type of learner the IB hopes to develop through its programs. At the school level, the Learner Profile is a set of ideals that can inspire, motivate and focus the work of schools and teachers. Schools are expected to consider how structures and systems, curricula, and units of work can enable students to develop into the learner described in the profile.

The Education Research Center at Texas A&M University (ERC at TAMU) was commissioned by the IBO to conduct a research study focusing on the Learner Profile attribute, *reflective.* In this study ERC researchers examined the implementation of the attribute by exploring how reflective is interpreted, how it is integrated into instruction and activities, how it is assessed, and how it benefits DP students. Researchers employed a 4-stage, mixed methods design as the framework for the study: (a) exploration, (b) identification, (c) investigation, and (d) comparison.

Researchers began the study by completing a best-evidence synthesis review of the literature (Slavin, 1986, 2009) on reflective thinking in secondary education settings. Results from the literature review (a) provided a framework for describing and recognizing reflective teaching practices, examples of reflection activities, and ways to facilitate and assess reflective thinking and learning; (b) identified benefits of student reflection in secondary school education; and (c) informed the development of the *Reflective Instruction Survey for Teachers and Administrators (RISTA).*

In the identification phase, researchers worked with the IB's research department to identify a large sample (*n* = 835) of IB DP schools in the US and Canada as potential recipients of the *RISTA.* Schools were further sorted by application of stratifying criteria, resulting in 213 schools that were invited to participate in the study. Of the 213 schools contacted, 31 responded affirmatively.

In the examination phase, ERC researchers administered the *RISTA* to teachers and administrators in 31 DP schools in the US and Canada. Survey results were used to identify ways in which the sample of DP

teachers and administrators interpreted reflective and the significance of the attribute in the written, taught, and learned curriculum. Survey responses were also used to identify six U.S. and Canadian schools that had successfully integrated instruction of reflective, as participants for in-depth case studies.

Each case (DP school) was first investigated and analyzed as a comprehensive, individual case (Merriam, 2009). Data were collected from each site to allow the research team to examine unique contextual factors might pertain to the case, and case narratives were developed for each case study site. Pseudonyms were assigned to schools and respondents in order to protect participants' confidentiality to the fullest extent possible.

Teams composed of researchers from the ERC at Texas A&M University collected data at the six schools chosen to participate, using classroom observation, student survey, and teacher and administrator interview instruments developed and adapted by the evaluation team specifically for this particular study. The Teacher Roles Observation Schedule–IB (TROS–IB) was used to systematically document observed teacher behaviors in the context of ongoing classroom instruction. Each teacher was observed for six to ten 30-second intervals during each classroom observation, allowing researchers to collect data to examine (a) teacher interactions with students, (b) use of various instructional settings, (c) reflective instructional practices, and (d) nature of teacher-student interaction in the classrooms visited. With regard to overall observed reflective practices, teachers were most frequently observed highlighting main or important points of lessons, soliciting multiple perspectives from students, and providing time for reflection. Critical reflective practices were evidenced in approaches such as Socratic coaching/questioning but were not frequently observed during our period of data collection. As such, this may be an area where the IB could provide further guidance to DP schools and teachers.

The Observation of Features for International Baccalaureate Program Instrument (OFIBP) was used at the end of class visitations to measure on a 3-point scale of *Not observed at all*, *Observed to some extent*, and *Observed to a great extent* the degree to which certain instructional processes or strategies were used or demonstrated during the class period. Instruction in most of the schools was observed to be student-centered, with teachers initiating experiences or activities and students being given the opportunity to further develop concepts on their own. In the classrooms observed, teachers were primarily evaluating student learning and providing feedback, while students were provided opportunities to be active participants in their learning.

The IB Student Reflective Thinking Questionnaire (IB–SRTQ) was administered to DP students aged 18 and older at the individual case study sites, to assess their perceptions of their reflective thinking. The survey, which was adapted from the Reflective Thinking Questionnaire (RTQ; Kember et al., 2000), utilized the four scales from the original *RTQ*: *habitual action*, *understanding*, *reflection*, and *critical reflection*. Overall, students surveyed perceived most strongly that their DP courses required understanding (M = 13.31, SD = 1.69) and perceived least strongly that DP courses could be successfully completed through habitual action practices (M = 8.86, SD = 1.88), such as memorization.

Qualitative data were gathered through in-depth interviews with teachers and administrators affiliated with the DP in their individual schools. Through an inductive analysis of the data, researchers first identified (a) themes and issues related to schools' individual understanding of reflective policies and pedagogical practices supporting reflection and (b) perceived benefits of reflective and reflective thinking for DP students.

In the final phase, comparison, researchers conducted a cross-case analysis (Merriam, 2009; Stake, 2006) to explore policies and practices across the case study sites that facilitate or inhibit student engagement with reflective thinking and identify learning outcomes that DP administrators, teachers, and students ascribe to reflective thinking. The final analysis also provides a rich description of the case study sites, with emphasis on site-specific outcomes identified as emerging from interpretations of reflective and strategies for integrating reflective thinking.

Introduction

Founded in 1968, International Baccalaureate (IB) programmess have grown significantly over the past 10 years and today are provided to more than 1,300,000 students and 4267 schools in 147 countries. The IB curriculum is offered through four IB programmes: the Primary Years Programme (PYP), the Middle Years Programme (MYP), the Diploma Programme (DP), and the Career-Related Programme (CP). All IB programmess encourage academic and personal achievement, inspiring students to excel in their studies and in their personal growth (International Baccalaureate Organization [IBO], 2015a).

IB programmes, including the DP, support student attainment of a range of 10 academic and non-academic attributes that are collectively described as the Learner Profile (IBO, 2015d). The Learner Profile reflects targets and values that become part of a school's culture and ethos when the institution is authorized as an IB World School. At the student level, the attributes and descriptors of the Learner Profile define the type of learner the IB hopes to develop through its programs. At the school level, the Learner Profile is a set of ideals that can inspire, motivate and focus the work of schools and teachers. Schools are expected to consider how structures and systems, curricula, and units of work can enable students to develop into the learner described in the profile.

The focus of the current study is the Learner Profile attribute, *reflective.* In this study, researchers assessed the reflectivity of students completing the DP, and documented the ways—and to what extent—reflective is recognized and incorporated in the DP by students, teachers, and administrators in IB World Schools. Specifically, researchers implemented a mixed-methods design to accomplish the following research objectives:

- Examine ways in which DP teachers, administrators, and students in IB World Schools define the Learner Profile attribute, reflective*.*
- Explore teachers' and students' perceptions of the role of reflective in the DP.
- Investigate ways in which school policies, pedagogical practices, curricula, and extracurricular activities support student reflection in DP schools.
- Document the extent to which IB Diploma students exhibit evidence of (a) reflective thinking and (b) the capacity to learn through reflection.

Theoretical Background

As a leader in international education, the IBO supports schools in providing students with challenging academic programs that encourage critical thinking from an intercultural perspective (Nugent & Karnes, 2002). The Diploma Programme has grown steadily since its inception, with the 2013 IB annual review reporting 70,627 Diploma candidates in 2611 schools worldwide (IBO, 2013b). Although the programme was originally intended to prepare geographically mobile students enrolled in largely private international schools, the IBO currently serves students from socioeconomically diverse backgrounds in public and private schools alike (Hill, 2012; IBO, 2013a). The IB diploma is accepted worldwide as a

gateway for entrance into the best and most rigorous universities (Burris, Welner, Wiley, & Murphy, 2007; Hill, 2012).

Based on two years of study and discussion among the IBO and schools around the world, the IB Learner Profile was established in 2006 as a new facet of the Diploma Programme. The Learner Profile converts the mission statement of the IB into learning practice for IB learners and into exemplars that focus the work of teachers and schools, explicitly delineating a list of 10 academic and non-academic qualities the IB strives to inculcate in its students in order for them to develop as life-long learners (Hill, 2012; IBO, 2006). IB learners strive to be (a) inquirers, (b) knowledgeable, (c) thinkers, (d) communicators, (e) principled, (f) open-minded, (g) caring, (h) risk-takers, (i) balanced, and (j) reflective (IBO, 2013c). Reflective, an attribute in the Learner Profile and the focus of this study, is delineated as follows: "[Students] give thoughtful consideration to their own learning and experience. They are able to assess and understand their strengths and limitations in order to support their learning and personal development" (IBO, 2015d).

Reflective thinking is a complex attribute that has many components or factors. Sometimes referred to as self-regulated learning (Schunk & Zimmerman, 2013) or as metacognition (Schraw & Dennison, 1994), factor analyses of surveys designed to measure reflective thinking provide support for at least two components: (a) knowledge about cognition and (b) regulation of cognition. Knowledge about cognition includes knowledge about learning strategies and knowing how and when to use different cognitive strategies (Baker, 2013). Regulation of cognition includes skills required for self-regulation of learning: planning, managing information, self-monitoring, identifying alternative strategies, and assessing one's own progress (Schraw & Dennison, 1994; Madjar & Assor, 2013). According to research studies, both of these components are related to improved student outcomes (Baker, 2013; Hattie, 2009; Madjar & Assor).

Research also indicates that reflective learners are better at developing strategies and have better academic and social performance than less reflective learners (Kosnin, 2007; Pressley & Ghatala, 1990; Swanson, 1990; Wentzel, 2000). Likewise, several studies have found that reflective learning is a set of skills that can be improved upon through instruction and practice (Patrick, Anderman, & Ryan, 2002; Van Den Hurk, 2006). Reflective thinking may be perceived in different ways by individual IB schools and teachers, and interpretation of the attribute reflective will determine the manner in which it is supported in IB schools.

Purpose of the Study

The purpose of the current study was to examine the implementation of the IB Learner Profile attribute, reflective, by exploring how reflective is interpreted, how it is integrated into instruction and activities, how it is assessed, and how it benefits DP students. Researchers employed a 4-stage mixed methods design that included (a) exploration of reflective thinking in the research literature, (b) examination of reflective thinking in IB DP schools, (c) investigation of strategies and policies that facilitate reflective thinking in IB DP schools, and (d) comparisons of select IB DP schools in order to develop detailed case

narratives of case study sites successful in the integration of reflective thinking in instruction and practice.

In the **exploration** stage, researchers conducted a best-evidence synthesis review of the literature (Slavin, 1986, 2009) on reflective thinking in secondary education settings. The exploration phase was purposed to (a) provide a framework for describing and recognizing reflective teaching practices, examples of reflection activities, and ways to facilitate and assess reflective thinking and learning; (b) identify benefits of student reflection in secondary school education; and (c) incorporate the findings from the best-evidence synthesis to develop the Reflective Instruction Survey for Teachers and Administrators (RISTA).

In the **identification** phase, researchers worked with the IB's research department to identify a large sample (*n* = 835) of IB DP schools in the US and Canada as potential recipients of the RISTA. Schools were further sorted by application of stratifying criteria, resulting in 213 schools that were invited to participate in the study. Of the 213 schools contacted, 31 responded affirmatively.

In the **examination** phase, ERC researchers administered the RISTA to teachers and administrators in 31 DP schools in the US and Canada. Survey results were used to identify ways in which the sample of DP teachers and administrators interpreted reflective and the significance of the attribute in the written, taught, and learned curriculum. Survey responses were also used to identify six schools that had successfully integrated instruction of the attribute reflective, and in-depth case studies were conducted at these sites.

In the final phase, **comparison**, researchers conducted a cross-case analysis (Stake, 2006) to explore policies and practices across the case study sites that facilitate or inhibit student engagement with reflective thinking and identify learning outcomes that DP administrators, teachers, and students ascribe to reflective thinking. The final analysis also provides a rich description of the case study sites, with emphasis on site-specific outcomes identified as emerging from interpretations of reflective and strategies for integrating reflective thinking.

Research Methods

Research Questions

This study of reflective in the IB Diploma Programme is guided by questions related to four research objectives established by the IBO: (a) Explore how IB World Schools, teachers, and DP students define the Learner Profile attribute reflective; (b) Identify the role schools, teachers, and students believe reflective plays in the DP; (c) Investigate how IB schools support student engagement with reflective through school policies, pedagogical practices, curricula, and extra-curricular activities; and (d) Document the extent to which IB DP students demonstrate reflective thinking and the capacity to learn through reflection. The following research questions provided the focus for the study:

1. What does the research literature indicate about reflective learning, specifically student benefits of reflective learning in secondary education?
2. How do IB DP administrators and teachers interpret the Learner Profile attribute reflective*?*
3. In what ways do the IB survey participants (teachers and administrators in DP schools) support reflection?
4. Which IB DP schools, based on survey results, best exemplify support for reflection?
5. To what extent do students at individual case study sites exhibit reflective thinking?
6. In what ways do teachers and administrators at the case study sites foster, instruct, integrate, and/or assess students' reflective thinking?
7. What interpretations, policies, and practices characterize successful models of integrating reflective thinking, and what suggestions can be made that would facilitate the integration of reflective thinking into policy and practice at IB DP schools?

Participants

Participants for this research study included IB DP teachers, administrators, and students from schools across the United States and Canada.

Data Sources and Collection

The research team employed a 4-stage, mixed-methods research design for this study. Quantitative and qualitative data were collected from the following sources: (a) surveys of DP teachers and administrators in schools across the US and Canada and (b) interviews with teachers and administrators, surveys of DP students, and classroom observations of DP classes at case study sites.

Survey data. The research team developed two surveys and administered them to participants during the course of this research study. First, the Reflective Instruction Survey for Teachers and Administrators (RISTA)*,* consisting of both close- and open-ended questions, was developed and administered to a sample of teachers and administrators (n = 802) in schools across the US and Canada in fall 2014. All surveys were administered electronically via SNAP© online survey software system,

which allowed researchers to download survey data directly. The RISTA consisted of 13 items targeting respondents' interpretation of reflective and perceptions of ways in which reflective is integrated in instruction and activities. Survey items were derived from the review of literature on reflective thinking, reflection, and self-regulated learning (Davis, 2003; Kember et al, 2000; Lim, 2011; Montalvo & Torres, 2004; Schunk & Zimmerman, 1998; Wilson & Bai, 2010). Stakeholders were invited via email to take part in the survey, and all surveys were voluntary. Email invitations included information regarding (a) the anticipated time commitment for the survey, (b) the intent of the research, and (c) the confidentiality of participants' responses. Consent to participate in the study was assumed by participants' willingness to proceed with the survey.

The research team also administered a paper-and-pencil version of the IB Student Reflective Thinking Questionnaire (IB–SRTQ) to DP students at the individual case study sites in spring 2015. Adapted from Kember et al.'s (2000) Reflective Thinking Questionnaire (RTQ)*,* the IB–SRTQ comprised 16 items, measured on a 4-point scale, targeting students' perceptions of their actions and practices related to reflection in DP courses. The RTQ has been found to be a reliable and valid measure of undergraduate student perceptions of their reflective thinking. Because most of the DP students surveyed were 18 or over, researchers felt that the IB–SRTQ could reliably measure DP students' perceptions of their individual reflective thinking actions. The research team provided written and verbal information regarding the intent of the research, confidentiality of participants' responses, and voluntary nature of survey participation, before asking for written assent from the students.

Although the Diploma Programme includes students aged 16-18, the Institutional Review Board (IRB) at Texas A&M University has very strict guidelines regarding research activities involving students under the age of 18—including survey administration. In order to receive IRB approval for this study, researchers were charged to provide parents with a letter of explanation regarding the study and to obtain written parental permission for any participating student under the age of 18. The feasibility of this process was explored with some IB coordinators, who expressed reservations about assuming the extra responsibilities it would entail. The researchers therefore determined to survey only students aged 18 or above, with one exception: Chadwick School, an independent, university preparatory school for girls. Chadwick's policy was that all parents of DP students, no matter the age of the student, should receive full information regarding the study and should provide written consent if they were agreeable to their student participating. Moreover, the Chadwick IB Coordinator willingly offered to distribute parental packets containing letters of information, permission forms for those parents agreeing to allow their students to participate, and blank envelopes in which to return the signed permission forms. Per IRB regulations, the blank envelopes containing signed permission forms were returned directly to the researchers, so none of the school faculty or administrators knew which students participated in the survey.

Interview data. The research team conducted semi-structured face-to-face interviews with teachers and administrators at each case study site in order to collect in-depth information regarding the DP in their individual schools. The IB coordinator at each school recruited individuals to participate in the interviews, which were scheduled during conference periods and after school. Interviews lasted about

25 minutes each and were audio-recorded for future transcription. The purpose of the interviews was to collect detailed information about participants' perceptions relating to their experience in an IB DP school, their interpretation of the IB attribute reflective, strategies they employed to integrate reflective thinking into their instruction and activities and to assess students' understanding of reflective thinking, and benefits of reflective and reflective thinking for their DP students.

Observation data. Researchers from the ERC at Texas A&M University conducted classroom observations during site visits at each case study site. Observations were conducted in as many IB DP classrooms as possible during each visit, with an emphasis on observing a variety of DP courses across subject areas and course levels of the DP programme (SL and HL).

The research team utilized two instruments in this evaluation. First, the Teacher Roles Observation Schedule–IB (TROS–IB), adapted from the Teacher Roles Observation Schedule (TROS; Waxman, Wang, Lindvall, & Anderson, 1990), was used to systematically obtain information on teacher classroom behaviors. The TROS–IB is a systematic observation instrument designed to document observed teacher behaviors in the context of ongoing classroom instruction. The instrument was adapted for use in the present study by replacing general instructional practice items from the original TROS-IB, such as "teacher redirects student thinking," with items specifically addressing teacher practices shown in previous research to support student reflective thinking (Postholm, 2011; Thomas, 2013; Van Grinsven & Tillema, 2006). Adapted items focused on the teacher's use and encouragement of reflective thinking, including modeling, questioning, and prompting.

Each teacher was observed for six to ten 30-second intervals during each classroom observation, allowing researchers to collect data to examine the following aspects of the classroom environment: (a) teacher interactions with students, (b) use of various instructional settings, (c) reflective instructional practices, and (d) nature of teacher/student interaction in the classrooms visited. For the purpose of this study, the focus of *interactions* items was on the teacher persona assumed by the instructor during the observed interval; e.g., teacher-as-manager, teacher-as-collaborator, etc. The focus of *Instructional setting* items was on the number of students with whom the teacher directly interacted during an individual observation interval, and the focus of *reflective instructional practice* items was on teacher demonstration of research-identified strategies that encourage reflective thinking, such as encouraging students to question ideas of others. Finally, the focus of *nature of teacher/student interaction* items was the explicit teacher actions noted during an observation interval.

Researchers alternated between use of the TROS–IB and field notes throughout each observation period in order to provide a detailed picture of the classrooms observed (Knight & Smith, 2004; Waxman et al., 2004). These systematic classroom observation procedures have been used in a number of research studies and have been found to provide valid and meaningful data for describing classroom instruction, evaluating school programs, and improving teachers' instructional behaviors (Alford, Rollins, Stillisano, & Waxman, 2013; Waxman, 2004; Waxman, Padron, Franco-Fuenmayor, & Huang, 2009).

In addition, the Observation of Features of International Baccalaureate Programs (OFIBP) instrument was used to examine the extent to which (a) teachers' general instructional practices and (b) student behaviors and activities were observed in the IB classrooms. The OFIBP has been used in previous research in IB schools (Alford, Rollins, Stillisano, & Waxman, 2013; Stillisano et al., 2010). The instrument measures the extent to which certain effective instructional strategies are demonstrated during a class period on a 3-point scale (1 = *not observed*, 2 = *observed to some extent*, and 3 = *observed to a great extent*).

Data Analyses

Data analyses for all data were conducted in fall 2014 and spring and summer 2015. This section provides an overview of the data analyses completed.

Survey data analyses. Survey data from the RISTA were primarily analyzed using Multivariate Analysis of Variance (MANOVA) to investigate whether there were significant ($p <. 05$) differences in DP respondents' perceptions of reflection by role (administrator, teachers teaching IB-only courses, and teachers teaching both IB and non-IB courses). Wilkes Lambda was used to determine whether MANOVAs revealed statistically significant differences, and Tukey post hoc tests were used to identify statistically significant differences between groups. Additionally, survey data were analyzed using descriptive statistics.

For each case study, survey data from the IB–SRTQ were primarily analyzed using descriptive statistics, focusing on mean scores and standard deviations of student responses by site compared to overall student survey mean scores and standard deviations. Cross-case analyses utilized Multivariate Analysis of Variance (MANOVA) to investigate whether there were significant ($p < .05$) differences in DP student perceptions of reflection by case study site. In cases where MANOVAs revealed statistically significant differences, Tukey post hoc tests were used to identify differences between case study sites.

Qualitative data analyses from interviews and open-ended survey questions. Qualitative data were analyzed for this study using a general inductive approach, guided by specific research objectives (Thomas, 2006). Detailed and repeated readings and interpretations of the raw data generated multiple codes, which were sorted into categories or families and condensed to create a framework of the most significant themes, relevant to the research questions.

Observation data analyses. For the individual case studies, observational data from the OFIBP and the TROS–IB were primarily analyzed using descriptive statistics, focusing on mean scores and standard deviations by site compared to overall mean scores and standard deviations. The mean percent score for observed instructional practices was calculated by dividing the number of intervals in which a practice was observed by the total number of observed intervals. Although field notes from classroom observations were not formally analyzed (e.g., content analysis), they provided support for observation context. Cross-case analyses utilized Multivariate Analysis of Variance (MANOVA) to investigate whether there were significant ($p < .05$) differences in DP teacher instructional practices by case study

site. Although our data did not meet homogeneity of variance assumptions according to Bartlett's Test of Sphericity, we proceeded with the MANOVA analyses because it has been shown that the F statistic is quite robust against violations of this assumption (Lindman, 1974). Pillai's Trace was used to determine whether MANOVAS revealed statistically significant differences. In cases where MANOVAs revealed statistically significant differences, Dunnett's C post hoc tests were used to determine differences in instructional practices between specific sites.

Results

This section reports the results of the current study, organized by the research questions. First, the results from the best evidence synthesis review of research literature on self-regulated learning, reflective learning, metacognition, and academic motivation—specifically in regard to reflective learning and student benefits accruing from reflective learning—are discussed. Second, findings from the RISTA responses are presented, focusing on (a) ways in which IB DP teachers and administrators interpret and support reflective and (b) identification of which IB DP schools exemplify successful support of reflection. Based on analyses of data from the in-depth case studies, we next discuss results related to the extent to which students at the individual case study sites exhibit reflective thinking and ways in which teachers and administrators at the case study sites foster, instruct, integrate, and/or assess students' reflective thinking. Finally, based on a cross case analysis of the individual case studies, we share interpretations, policies, and practices that characterize successful models of integrating reflective thinking and offer suggestions for successfully facilitating the incorporation of reflective thinking into policy and practice in IB DP schools.

Research Question 1: What does the research literature indicate about reflective learning and student benefits of reflective learning in secondary education?

The research team conducted a systematic literature review on student reflection across content areas and encompassing Grades 7–12 settings in order to identify theoretical approaches and practical aspects of reflective. The initial literature search located 7,603 items, 97 of which were retained for coding. These 97 articles were coded using a standardized coding form and the matrix method (Garrard, 2011) to organize results and to provide a structured mechanism for comparison among the articles. Information from the 97 articles was sorted into four distinct categories: (a) interpretations of reflective, (b) instructional strategies for developing reflective thinking, (c) assessment and measurement in reflective thinking, and (d) benefits of reflective thinking.

Interpretations of Reflective

Three broad themes emerged from the literature on the interpretation of reflective. First, reflection is viewed as a set of metacognitive skills and practices known as metacognitive reflection (Mitchell, 2010; Tanner, 2012). Second, reflection is defined as reflectivity, which entails separating a new experience from one's own background and bias in order to view the new experience from a different, often cultural, perspective (Blank, 2000; Kember, McKay, Sinclair, & Wong 2008). Third, reflection is a

sequence of steps called process reflection, similar to an inquiry process, that starts with an experience and leads to a changed understanding and an action (Davis, 2003).

Metacognitive reflection. Appearance of the term, metacognition, is credited to developmental psychologist John Flavell (1979). Research in this area of cognition includes identifying specific metacognitive aspects or attributes—such as reflection—and identifying strategies for teaching metacognitive properties to students. Metacognition refers to knowledge of one's own cognitive processes or anything related to them (Tanner, 2012). It is knowledge or awareness of what one knows or does not know and includes the ability to manage one's learning through planning, monitoring success, correcting errors, identifying gaps, and discerning priorities.

Reflection is one aspect of metacognition, along with self-regulated learning (Fox & Riconscente, 2008). Research shows that students who work toward mastery achievement goals are more likely to achieve specific task goals (Ainley & Patrick, 2006; Zimmerman & Bandura, 1994). At its core, this development of self-regulated learning skills and metacognitive abilities gives students control over their own learning (Boekarts & Cascallar, 2006). Dunlosky and Ariel (2011) describe this control as "the detection of a discrepancy between the current state of a system and a goal state" (p. 104), resulting in a link between self-regulation skills, metacognitive skills, and goal setting.

Metacognition skills result in reflecting upon thinking, actions, and goals. Furthermore, students reflect on three aspects of their learning: cognition, affect, and effort (Efklides, 2011). This model of viewing metacognition is known as the Metacognitive Affective Model of SRL (MASRL model; see Efklides, 2011). In the MASRL model, metacognition, motivation, and affect interact to explain how a learner decides to manage a task in terms of effort. Moreover, the model explains the complex, bottom-up process of self-regulation, in which motivation determines the amount of cognitive energy expended to complete an activity. Finally, the model analyzes how the level of task difficulty influences the person and results in long-term self-regulation, delineating the connection between reflective thinking, metacognition, motivation, and self-regulated learning. Students with strong reflective skills are able to view tasks from the perspective of a motivated learner, even when the task is challenging or uninspiring. Consequently, this reflective thinking builds stronger self-regulated skills, which, in turn, results in students who are able to successfully complete activities.

Critical reflectivity. Intercultural perspectives are crucial to the success of a 21st century learner. As education has become more global, understanding the point-of-view of different cultures has correspondingly become an increasingly complex and essential skill. Reflective thinking provides a bridge between understanding one's own self and understanding others. Dietz and Mateos Cortes (2012) describe this bridge as "an intersectional field of academic knowledge and professional development" (p. 411). As students better understand and reflect upon cultures, they develop themselves as citizens, while meeting educational objectives. Critical reflexivity, therefore, is relevant to contemporary, multicultural education (Dietz & Mateos Cortes; Gundara, 2001).

Critical reflexivity, however, encompasses more than just gaining a basic understanding of other cultures: It also includes the development of inclusion. Rather than focusing on others' group identification, students learn to identify others as individuals (Jenkins, 2004; Pollman, 2009). In achieving this goal, students also become consumers of their academic knowledge within a community of peers who actively produce and share ideas (Luxton-Reilly & Denny, 2010). Critical reflexivity thus contributes to the development of student participation in learning together and learning to collaborate (Wall, 2012).

Process reflection. Reflection is a complex process that is challenging to summarize in a few key points. According to Dewey (1933), this process includes the ability to be open-minded, whole-hearted, and responsible. These three aspects of the reflection process are further defined by Dimova and Loughran (2009), who suggest that students must have the ability to meditate on problems in innovative ways, must be engaged in active thinking, and should consider the consequences of their actions. These skills are seen in Boyd and Fales' seminal definition of process reflection:

> Reflective learning is the process of internally examining and exploring an issue of concern, triggered by an experience, which creates and clarifies meaning in terms of self, and which results in a changed conceptual perspective. (1983, p. 100)

Finally, Kember et al. (2008) describe this process as an examination of beliefs, experience, and knowledge that leads to perspective transformation.

The process of reflection can be categorized into four levels: (a) habitual action/non-reflection, (b) understanding, (c) reflection, and (d) critical reflection (Kember et al., 2008). This process is deliberate and is often stimulated by problem-solving situations that require students to actively question their knowledge and experience (Lim, 2011; Rogers, 2001). The first step of the process, habitual action or non-reflection, involves creating the habit of reflective thinking. Students are not actually reflecting; they complete an academic task by simply providing an answer. Relatively little to no additional thought or understanding is reached (Kember et al.). At this level, students are ready to attempt reflective thinking but do not have the skills to do so.

In the second step of process reflection, students seek understanding. In addition to providing answers to critical-thinking or problem-solving tasks, students are attempting to understand the underlying concepts surrounding the topic (Kember et al., 2008). Students are beginning to be reflective at this point. Reflection occurs next, in the third step of the process, as students connect their understanding to personal experiences (Kember et al.). The connection to their own experiences, knowledge, and beliefs is the key difference between reflection and understanding, which does not include personal connections. Finally, at the highest level of reflection, students engage in critical reflection. Critical reflection includes a transformation in perspective (Mezirow, 1991) that is the result of thinking about one's own learning.

Instructional Strategies for Building Reflective Thinking

The research team examined 27 studies specifically focusing on instructional strategies and learning outcomes related to building student reflective thinking in secondary and higher education. Three main themes emerged from this review: (a) reflective thinking strategies generally result in increased academic achievement; (b) development of student reflective thinking is a complicated process requiring a focus on multiple types of strategies, including cognitive, metacognitive, and affective/motivation strategies; and (c) teacher actions—including teacher discourse, design of instruction and the learning environment—make the greatest difference in students' development of reflective thinking. Studies are grouped according to these themes for following discussion.

Reflective thinking and academic achievement. Of the 27 studies examined, 10 focused on the influence of reflective thinking and/or self-regulated learning and metacognitive strategy use or instruction on student achievement and learning. In a study with undergraduate psychology students (n=165), van den Hurk (2006) found that student self-reports of greater self-monitoring of learning resulted in greater test scores. Chiu, Chow, and McBride-Chang (2007) and Singh (2011) found similar results in studies involving high school students. In a survey of 15-year-olds (n = 158,848) from OECD countries, Chiu et al. analyzed student self-reports of metacognitive strategy use, such as planning and self-evaluation, and found increased metacognitive strategy use to be correlated to increased achievement at both the individual and school levels. Singh looked at whether self-regulated learning processes related to motivation, metacognition, and creativity impacted the ability of gifted high school students (n = 53) to perform in an advanced accounting course. Students in the experimental group, who were allowed to work independently and encouraged to utilize self-regulated learning processes, significantly outperformed students in a matched control group on problem solving tasks. Students in the control group received the same content in a traditional direct instruction format.

While the van den Hurk (2006), Chiu et al. (2007), and Singh (2011) studies looked at self-reports of students' natural inclinations to use self-monitoring and its relationship to achievement, Azevedo and Cromley (2004) found similar results with 135 undergraduates who were trained in the use of self-regulated learning techniques, including activating prior knowledge and task planning. The students in the experimental training group obtained higher post-test scores than students in the control group, who focused on recall as their primary means of reflection. In another intervention study with 16 final-year biology students, Conner (2004) found that students who completed activities designed to promote metacognition, including journal prompts where students were encouraged to evaluate their learning skills independently and to plan and monitor their work, produced final examination essays of higher quality than those from students in previous years.

DeCorte, Verschaffel, and Masui (2004) utilized a four-part instructional model known as CLIA (competence in a particular domain, learning processes including metacognition, intervention from the instructor when necessary, and assessments that monitor student progression toward competence) to design and test student acquisition of productive knowledge and learning and thinking skills. The study focused on the competencies of self-judging, learning to plan, coping with emotions, and reflecting, in a context closely aligned with students' personal goals in a business economics course at the university

level. Students were given a number of formative assessment opportunities to measure progress toward their learning goals. In comparison to two control groups (*n* = 94), one receiving no intervention and the other receiving instruction on analyzing and rehearsal strategies, the experimental students (*n* = 47) demonstrated significantly more metacognitive knowledge and awareness. In addition, a positive relationship was observed between meta-knowledge of self-regulatory activities and academic performance.

Like DeCorte et al. (2004), Cazan (2012) utilized an intervention addressing multiple aspects of developing reflective learners, including metacognitive, cognitive, behavioral, and motivational aspects of self-regulated learning. Involving 79 undergraduate psychology students, the study utilized a pre-/post-test design to identify effective methods of instruction for self-regulation and reflection, including use of learning journals, group reflection, self-evaluation, and self-regulating questionnaires. In addition, students used concept maps, note taking and critical reading strategies, and chapter outlines to reflect on course content. Results showed that students made significant improvements in metacognitive strategies, including task analysis, strategy self-selection, and self-monitoring. An additional finding was that not only did training in self-regulating and reflective strategies improve student skills between the pre- and post-tests, analysis of student skill levels between the post-tests showed that skills continued to improve over time, demonstrating that more time with the intervention equaled greater improvement in self-regulatory and reflective skills.

In addition to metacognitive, cognitive, behavioral, and motivational aspects, three additional studies focusing on metacognitive strategies and feedback (Kim, Park, & Baek, 2009; Krause & Stark, 2010; Van den Boom, Paas, & van Merrienboer, 2007) analyzed social aspects of learning in interventions. In their work with undergraduate students in a statistics course (*n* = 137), Krause and Stark found social condition (individual or dyad) to have no effect on student achievement. Individual students receiving immediate feedback on the correctness of answers to multiple-choice problems scored significantly higher on the post-test than did individuals receiving no feedback in either treatment (individual or dyad), indicating that interventions promoting student reflection may have a greater influence on student achievement than social condition. The results of Kim et al.'s study focusing on ninth grade students (*n* = 132) in a game-based environment, however, run counter to findings that social condition does not effect achievement. Researchers found the process of thinking aloud with peers between gaming sessions to be significantly positively correlated both to gaming performance and to performance on an achievement test. Finally, in a study with undergraduate psychology students (*n* = 49), Van den Boom et al. found that social condition combined with reflective practices influences student achievement. Students receiving feedback on their course reflections from peers or a tutor outperformed students working individually with or without feedback on reflections.

Process of developing reflective thinking. The conflicting findings of the three studies previously discussed (Kim, Park, & Baek, 2009; Krause & Stark, 2010; Van den Boom, Paas, & van Merrienboer, 2007) related to reflective processes and social condition highlight the fact that developing reflective thinking is a complicated process, involving multiple variables related to aspects of cognition,

motivation, age, and environment. Of the 27 studies included, six explored the multiple avenues through which metacognition, reflective thinking, and self-regulated learning are developed.

In a 2007 study with undergraduate psychology students (*n* = 84), for example, Berthold, Nuckles, and Renkl analyzed the effects of metacognitive training—including monitoring and self-assessment— whether implemented in isolation or in combination with cognitive training, including organization and elaboration strategies. Findings showed that metacognitive training alone did not improve student achievement on a post-test, nor did it change the accuracy of students' self-assessment of their learning. When combined with cognitive prompts such as questions about the main points of an opinion on a topic, however, metacognitive prompts were shown to encourage growth in student use of metacognition on a post- test.

Because Berthold et al.'s (2007) original study did not include opportunities for students to revisit material, if necessary, in order to remediate their thinking, a follow-up study with an additional 103 students (Nuckles, Hubner, & Renkl, 2009) expanded the intervention to give students an opportunity to remediate their initial cognitive strategy (i.e., their initial summary of material) if metacognitive prompts resulted in misunderstanding of material. This revised self-regulated learning cycle, involving cognitive strategies entailing organization and elaboration, metacognitive strategies involving monitoring of understanding, and remedial strategies in cases of perceived comprehension problems, proved most beneficial to student comprehension and retention of material when compared to all other conditions.

In two additional studies, the interactive effects of cognitive and metacognitive interventions on students were also examined. Similar to the results from aforementioned studies looking at cognitive and metacognitive interventions, a 2013 study by Michalsky, which looked at the effect of various think-aloud protocols on the scientific literacy growth of 10th grade science students (*n* = 198) found that students utilizing cognitive, metacognitive, and motivational think-aloud prompts outperformed all other groups in scientific literacy growth and each assessed skill, as well as in self-perceived self-regulated learning ability and strategy use in think alouds. In a study with eighth grade mathematics students *(n* = 249), Perels, Gurtler, and Schmitz (2005) found that a combined self-regulated learning and problem solving intervention showed significant growth over other self-regulatory or problem solving training alone, on a problem-solving test. Additionally, self-regulation training improved problem-solving skills.

A final group of studies explored relationships between student affect and the development of reflective thinking and self-regulated learning. In a study with 366 undergraduate students examining student approaches to learning, self-regulation, and cognitive strategy use, Heikkila and Lonka (2006) found that student attitudes towards learning, both positive and negative, were intertwined with student approaches to learning. Deep approaches to self-regulated learning were related to an optimistic outlook, whereas maladaptive approaches to learning, such as task-irrelevant behavior and a surface approach to content, were related to a negative outlook and external regulation. Phan (2009) looked at the effect of goal orientation on the achievement and reflective thinking practices of undergraduate psychology students *(n* = 347). Study findings indicated that mastery and performance goal orientations

directly influenced student reflection on their work, with a mastery goal orientation having the strongest effect on student reflective thinking. Researchers concluded that achievement gains of students with these goal orientations might be the result of a reciprocal relationship between student goal orientation and reflective thinking. Students who pursue mastery and performance-approach goals are, in general, more likely to adopt the use of reflection to facilitate better understanding and analysis of knowledge and skill improvement.

Teacher actions and reflective thinking. The role of classroom teacher actions in the development of student reflective thinking, including teacher discourse, design of instruction, and manipulation of the learning environment, were highlighted in 11 studies. Of these, three studies focused specifically on the effects of implicit versus explicit teacher discourse related to self-regulated learning and metacognition. In a study with 538 eighth grade mathematics students, Kistner et al. (2010) examined the effect of implicit versus explicit self-regulated learning instruction on student learning gain. The researchers found that 85% of the self-regulated learning instruction in the 20 classrooms studied was implicit; i.e., related to a constructivist or cooperative learning environment rather than voiced directly by the instructor. On a post-test, implicit instruction was not positively correlated with a learning gain for students, whereas explicit, or teacher discussion or modeling of self-regulated learning strategies, was positively correlated with learning gain.

Lau (2012) found similar results in a study with 10th grade students *(n = 1,121)* in a Chinese language class. Student self-regulated strategy use was positively correlated with explicit self-regulated strategy instruction, including teacher modeling, prompts, and systematic teaching sequences. Thomas (2013) looked at the effect of teacher change in the metacognitive orientation of his classroom, from implicit to explicit metacognitive strategy instruction in an in 11th grade physics class. The teacher made his thinking explicit by directly teaching a specific metacognitive strategy to students and reinforcing its use with questioning as he monitored student learning. Before the teacher modified his metacognitive instructional approach, none of the students interviewed *(n = 29)* recognized any use of metacognitive strategies. After the teacher's modification, however, statistically significant increases were found in student perceptions of the cognitive demands of the course, as well as in student performance on a measure of student self-efficacy related to metacognition and science learning.

The effects of various methods of teacher scaffolding of self-regulated learning and student reflection were examined in four studies. In studies with Year 9 science students *(n = 28)* and Year 11 psychology students (n=26), Askell-Williams, Lawson, and Skrzypiec (2012) found that teacher utilization of a written learning protocol for students resulted in meaningful improvement for Year 9 students in representations of knowledge, as well as improvements in knowledge representation and reflection in Year 11 students. Quinton and Smallbone (2010) found that the use of scaffolded feedback sheets with undergraduate students *(n = 167)* resulted in greater self-reflection and student identification of remediation needs. Moreover, in a 2007 study using a web-based search-process feedback system with undergraduate students *(n = 38)*, Saito and Miwa concluded that students who received scaffolding in the form of prompted feedback on search techniques exhibited significantly higher numbers of search strategies compared to a control group and were more likely to change their thinking about how to seek

information on the web. Finally, in a 2012 study with 10th grade students *(n* = 70), Weshah focused on a variety of teacher scaffolding tools for building reflective thinking that were incorporated in an instructional program focused on problem-based learning. In the experimental group, teacher use of a variety of scaffolding tools such as reflective questions, graphic organizers, and guide sheets resulted in significantly higher scores on the post-test for experimental group students, underscoring the critical role teachers play in guiding student development of reflective thinking within problem-based learning.

A final group of studies focused on the influence of the classroom-learning environment on the student perceptions of self-regulated learning. Postholm (2011) explored the perceptions of self-regulated strategy use of 260 eighth through 10th grade students. Discourse analysis revealed that student strategy use was influenced by both the perceived difficulty of content and by student perceptions of teacher expectations, thus supporting the findings of several other studies that indicated that teacher actions when creating a classroom-learning environment make a difference in student self-regulated learning practice. In a study of 623 secondary students, Van Grinsven and Tillema (2006) found similar results related to student perceptions of the learning environment. Student perceptions of teacher behavior in self-regulated learning environments, specifically in individual work, project-oriented and project-based learning environments, were found to significantly influence student perceptions of self-regulated learning as a means of facilitating their understanding. Researchers found that the way students feel about a learning environment is critical for their subsequent participation and learning efforts. Chang (2005) found similar results regarding student goal orientation with a group of undergraduate students (*n* = 28) in a web-based environment. Study results indicated that incorporating self-regulatory strategies into web-based instruction resulted in significant changes in students' intrinsic goal orientation, task value, control of learning, and self-efficacy.

Finally, in a study with 366 undergraduate students examining student approaches to learning, self-regulation, and cognitive strategy use, Heikkila and Lonka (2006) found that both positive and maladaptive approaches to learning were intertwined with student strategy use or lack thereof. Findings from this study mirrored previous findings that student belief systems related to learning remain stable as students advance in school (Eronen, Nurmi, & Salmela-Aro, 1998; Nurmi, Aunola, Salmela-Aro, & Lindroos, 2003; Vermunt, 1998). Because of this, researchers highlighted the need for teachers to cultivate learning environments that develop self-regulatory skills in order to change student belief systems.

Assessment and Measurement in Reflective Thinking

Although a large body of research argues for and supports inclusion and implementation of reflective thinking in K-12 schools, there is a dearth of instruments available to assess and measure this construct. One reason for the lack of instruments may be that reflective thinking is a difficult construct to capture and interpret. Most data on the topic are related to student portfolio use, interviews, observations, and other qualitative assessments. Additionally, for instruments that are available, participant truthfulness when completing surveys or questionnaires is a major concern. Several studies discuss findings that

indicate participants do not answer survey items in a way that truly captures their thinking, metacognition, or reflection (Jacobse & Harskamp, 2012; Sperling, Ramsay, Richmond, & Klapp, 2012).

In studies reviewed for this paper, the construct of reflective thinking was most often measured in two broad sub-categories: (a) habitual action and (b) thoughtful action. This indicates that reflective thinking occurred when students formed habits that naturally led them to think about their thinking, use strategies, or reflect on their understanding. Conversely, when students have not formed habits, or if they encounter unfamiliar information, they implement thoughtful action in reflective thinking. This is actively trying new strategies or tools to reflect on what they have learned.

Researchers identified four instruments as contributing to the field of reflective thinking by capturing the complex construct. These instruments have been tested on post-secondary students and teachers, but rarely on K-12 students, and have been validated through multiple studies and have maintained acceptable levels of reliability. The four instruments are as follows: (a) The Reflection-in-Learning Scale (Sobral, 2000), (b) the Metacognitive Orientation Scale: MOLES-S (Thomas, 2002), (c) the Questionnaire for Reflective Thinking (Kember, et al., 2000), and (d) the Self-Efficacy and Metacognition Learning Inventory–Science (Thomas, Anderson, & Nashon, 2008).

The Scale of Reflection-in-Learning consists of 15 Likert-type items, 14 of which are designed to elicit information about the types of reflection in which the students engaged during an activity. The questions are phrased to inquire about the type of thinking the students were aware of as they completed an activity. The final question asks about the students' efficacy or personal abilities. It is intended that responses to this question will be compared with answers to previous questions to assess how truthful the student has been in completing the survey.

The Metacognitive Orientation Scale: MOLES–S (Thomas, 2002) focuses on what is occurring in the classroom or with the teacher. It can be completed by students in the class or by a third party in conjunction with observations. The questions ask how often students are requested to reflect or to think metacognitively, as well as how supportive to reflective thinking the classroom environment appears to be. Used with other measures, this scale can give a good picture of what is occurring within classrooms.

The Questionnaire for Reflective Thinking (Kember et al, 2000) asks 16 questions that are broken up into four sub-scales. Students either agree or disagree, and to a certain extent, with each item. The four sub-scales are (a) habitual action, (b) understanding, (c) reflection, and (d) critical reflection. Again, these questions elicit answers that reveal a student's thinking throughout an activity or what kinds of strategies the student typically employs to solve a problem.

Finally, the Self-Efficacy and Metacognition Learning Inventory–Science (Thomas et al., 2008) is a scale that asks students to rate how often they engage in certain thinking behaviors or utilize certain strategies, specifically in science classes. Although the instrument is focused on science, it can be adapted to other content areas. The questions ask students to rate how often they ask teachers for

assistance, find connections among learning, evaluate their individual learning processes, and stay focused—among other indicators of reflective thinking.

Benefits of Reflective Thinking

Although reflection and reflective thinking have received a great deal of attention in recent research, studies have been largely in the area of reflective strategies that may not necessarily be tied to specific outcomes for students. Research studies specifically focusing on benefits and outcomes of reflective thinking, several of which are specific to online learning, show mixed results. Two main themes emerged from studies retained on the benefits of reflective thinking: (a) Reflective thinking may provide greater affective and perceptual benefits than academic achievement, and (b) there may be a threshold for the benefits of self-regulation in online environments.

Greater affective benefits and participants' perceptions. The leading assumption exhibited in the introductions to many research articles related to reflection is that greater instances of reflective thinking will yield higher academic scores and achievement outcomes. This assumption is affirmed in several articles, including one by van den Hurk (2006), who found a significant positive relationship between students' self-monitoring and their test scores. In a study regarding ethical decisions of 134 undergraduate business students, Antes et al. (2012) asked participants to read several case study scenarios, reflect on a relevant case from their own experience, and respond to several questions. Results from this study indicate that reflection leading to experience-based application was related to more ethical decisions and higher ethicalness.

Other studies, however, have found that reflection has only a slight or no effect on cognitive or achievement-based outcomes (Cisero, 2006), although reflective thinking and practice do appear to impact participants' perceptions of and affect toward certain tasks, such as assessment procedures (Mao & Peck, 2013; Verpoorten, Westera, & Specht, 2012). Investigating the effect of reflective writing on course performance, Cisero (2006) compared two groups of students taught by the same instructor. The experimental group (*n* = 166) was assigned a reflective journaling component that was absent in course requirements for the control group (*n* = 317). Results from three exams given throughout the duration of the course showed a very similar mean performance for the two groups (intervention: *M* = 76.17, *SD* = 12.6; control: *M* = 75.15, *SD* = 12.0), although the intervention group's median performance was higher than that of the control group (77.17 and 74.72, respectively; p. 233). Findings show that when student scores were converted to letter grades, the intervention group displayed significantly fewer earned grades of C and D, as well as slightly higher earned grades of A and B than did the comparison group. These results affirm the benefits of reflective thinking on achievement, although the effect in this case is small.

Measuring self-perception of reflective learning's benefits, Richard (2010) implemented an instrument (*Module Reflection Worksheet*) for self-monitoring of reflection, which was reported by participants (*n* = 100) to be an effective tool for engaging in learning and developing higher-order thinking skills (*t*(99) = 232.58), *p* < .001). Additionally, participants reported perceived benefits from reflective learning

practices that were prompted through the use of the aforementioned reflection worksheet *(t(99)* ~150.81), *p*< .001). Thus, while no data were reported regarding the effect of reflective practices on students' academic achievement, this study further indicates participants' perceptions were positive in relation to reflection.

Possible threshold for benefits of self-regulation in online environments. Several researchers have specifically investigated the benefits of self-regulation and reflection in online learning environments. In a study using *reflection triggers*, defined as "deliberate prompting approaches that offer learners structured opportunities to examine and evaluate their own learning," (p. 1030) with online self-regulated learners, Verpoorten et al. (2012) report participants' favorable perceptions toward and frequent usage of these reflective promptings with 54% of participants reporting reflection triggers as contributing to their learning. Learner performance and retention as displayed in a final test and retention test, however, showed no significant, positive effects.

Similarly, Mao and Peck (2013), examining the role of self-regulated learning in an online course's formative assessment process, found that participants who engaged in self-regulated learning strategies (self- and peer-assessment) showed no statistically significant difference in immediate skill-based and cognitive learning outcomes. Nonetheless, participants who experienced self-regulated learning through peer-assessment (*n* = 23) exhibited significantly higher scores on a final essay than did participants who self-assessed (*n* = 22) or who were only provided feedback from an instructor (*n* = 23) with a mean score difference of 6.83 (*p*<.01). These results indicate that students who participate in active feedback by providing it for others may trigger active reflection and application in regard to their own work, thus experiencing greater long-term benefits in contrast to those who passively receive feedback from an outside source (e.g., an instructor or teaching assistant), which does not seem to spark any further student reflection.

Moos (2010) investigated the role of self-regulated learning (SRL) role in relation to hypermedia, finding a positive relationship. Each of three SRL variables (planning, monitoring, and strategies) showed a significant effect on learning outcomes, after controlling for prior knowledge as measured by a pretest. Findings also suggest, however, that the relationship between SRL use and learning may have a threshold; results of this study indicate increased use of SRL may not relate to increased outcomes. The study highlights the possibility of SRL's diminishing benefits, as it showed no significant difference on performance for students who utilized SRL strategies at a high frequency as compared to an intermediate frequency of usage. These mixed results continue to call into question the exact benefits of reflective thinking for students. As noted before, some researchers assert that the benefits of reflection to participants' perceptions and affects are more prominent than are academic achievement outcomes.

Conclusions

Overall, the literature review identified many contradictory findings related to reflective thinking. This construct, however, is still under-researched in the education field, most likely due to the difficulty in

measuring reflective thinking and lack of a clear, agreed-upon definition. Researchers interpret the construct of reflective thinking in various ways, ranging from different cognitive skills and abilities to cultural perceptions. Reflective thinking, therefore, represents cognitive mental processes as well as affective measures. Currently, studies do not combine the two interpretations but view them as separate. Our review, however, does show that reflective thinking occurs in the instructional practices of teachers, although the results are mixed on how this process affects students. In some studies, student achievement greatly increased as a result of reflective thinking, but other studies found that students were distracted by the extra mental process required for reflective thinking. One consistent finding among studies, however, is that the teacher heavily influences how students interpret reflective thinking: When teachers modeled and encouraged students to practice reflective thinking, students' achievement and skills in reflective thinking improved.

Finally, many benefits of reflective thinking are described in the literature, including increases in student achievement, more cultural awareness, and deeper understanding of content material. Ultimately, we found that reflective thinking is difficult to assess, due in part to the lack of instruments capable of measuring the construct and the complexity of the concept. Although instruments collecting perceptual data and Likert-type scales exist for measuring the construct, they are based upon self-report data. Observation instruments also exist to examine the phenomenon of reflective thinking, but they cannot investigate the cognitive processes involved. Further research on reflective is needed, with clear goals of (a) better defining the exact process that results in student reflective thinking and (b) creating instruments for accurately and objectively assessing reflective thinking.

Research Question #2: How do IB Diploma Programme Administrators and Teachers Interpret the Learner Profile Attribute *Reflective?*

In response to research question #2, the research team administered the RISTA (Appendix A) to teachers and administrators at a sample of IB DP schools in Canada and the US (*n* = 31). Schools were chosen to participate in the study via a multi-step process. First, schools that met the following criteria were selected from a large database, provided by the IBO, of all U.S. and Canadian schools: (a) included an established Diploma Programme, (b) utilized English as the primary language for instruction, and (c) located within the US or Canada.

These search criteria yielded 927 schools, of which 837 reported at least one DP student per year for years 2011-13. In order to identify IB schools with a greater likelihood of a DP culture or environment,[1] schools were further sorted by the following additional criteria: (a) The school had 100 or more DP

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[1] Culture can be defined as consisting of the shared behavioral configurations and interactions existing among members of a group, as well as the cognitive constructs and interpretations (Center for Advanced Research on Language Acquisition, 2015). Internalized through a process of socialization, these group norms and social patterns contribute to the development of a unique group identify. In an established Diploma Programme, social and behavioral patterns might include features such as developing skills and attitudes toward learning that prepare students for higher education, increased understanding of one's own and others' cultures, and enhanced personal and interpersonal development (IBO, 2015d).

students combined over a 3-year period, and (b) DP students comprised at least 25% of the IB students in Grades 9-12. This produced a count of 213 schools meeting the selection conditions.   The majority of potential participant schools were located in the northeast and southeast regions of the US, with 47 out of the 213 in Florida alone.

In order to obtain email addresses for teachers and administrators at the potential survey sites, researchers sent email messages to the IB coordinator and principal and/or head of school at each of the 231 schools that met the selection criteria. The email described the purpose of the study, explained that the study was commissioned by the IB, and invited the school to participate. Email addresses for teachers and administrators, for the purpose of administering the RISTA, were subsequently requested from the 31 schools that expressed interest in participating.

The RISTA included 13 items targeting respondents' interpretation of reflective and perceptions of ways in which reflective is integrated in instruction and activities. Survey items were derived from the review of literature on reflective thinking, reflection, and self-regulated learning (Davis, 2003; Kember et al, 2000; Lim, 2011; Montalvo & Torres, 2004; Schunk & Zimmerman, 1998; Wilson & Bai, 2010). Respondents were asked the extent to which they agreed with statements, using a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree,* and *4 = Strongly agree*.

Due to a small faculty sample size at many of the DP sites surveyed, analysis was conducted at the overall, rather than site level, for the three faculty groups completing the surveys: DP administrators, teachers teaching only IB DP courses, and teachers teaching both IB DP and non-IB courses. The three respondent role groups were chosen as the units of analysis, rather than subject area groups, due to the fact that, while survey respondents could select multiple subjects in which they taught, which resulted in overlapping groups, they were required to choose one role that best described their current position. The use of respondent role as the independent variable for analysis insured the groups would be non-overlapping in terms of participants.

DP Faculty Perceptions of the Definition of Reflection

To analyze respondents' perceptions of how reflection is defined, we first conducted a preliminary, exploratory factor analysis on the 13 items targeted at measuring respondents' interpretation of reflection. The factor analysis resulted in 4 factors with Eigenvalues greater than 1, which accounted for 62.01% of the variance. Inspection of the factor loadings for the individual survey items, however, did not yield interpretable factors. We therefore constructed two scales based on the broad themes from which the survey questions were drawn: (a) reflection primarily focused on cognition (i.e., metacognitive processes and process reflection; Davis, 2003; Flavell, 1979; Lim, 2011), and (b) reflection on self (i.e., reflection primarily focused on the changes in one's cognition and/or affect due to experiences; Boud & Walker, 1998; Mezirow, 1997; Schön, 1983). Internal consistency reliability of the scales was calculated using Cronbach's alpha. The reliability of the two factors was .70 and .74, respectively. The inter-scale correlation is 0.574, which indicates that the two scales overlap to a moderate extent. This overlap was

not surprising, given that a great deal of overlap exists regarding definitions of reflection in the research literature.

One-way MANOVAs were conducted by IB DP role (administrator, teachers teaching IB courses only, and teachers teaching both IB and non-IB courses) on the two factors, reflection on cognition and reflection on self, to determine if statistically significant differences (p < .05) existed between the three groups' interpretations of the Learner Profile attribute reflective.

Reflection on Cognition

A one-way MANOVA was conducted by IB DP role on the reflection on cognition items. The results of the MANOVA revealed a significant difference among the three groups (*Wilks' lambda* = .883, *F*(2, 342) = 2.69, *p* = .001.   Tukey post hoc results are reported for respondents' interpretation of the reflection on cognition survey items in Table 1. The IB DP administrators were significantly more likely than faculty teaching IB courses only to perceive reflective thinking as a skill that could be most effectively taught through practice of an iterative cycle of steps or through practicing reflective strategies. In addition, IB administrators were significantly more likely than both groups of IB DP teachers (IB-only or IB and non-IB) to think that reflection is most effectively taught through explicit instruction of the concept. The mean scores of the reflection on cognition items ranged from 2.55 to 3.64 with relatively high standard deviations (0.49 – 0.76), indicating high variability in the data.

Table 1
Interpretation of Reflection on Cognition: Mean Level of Agreement by Role

Items	Administrators (*n* = 33)		Teachers–IB classes only (*n* = 86)		Teachers–IB and non-IB classes (*n* = 226)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*
Reflection can be most effectively taught or encouraged through practice of reflective thinking strategies.	3.64[b]	0.49	3.30[a]	0.56	3.42[ab]	0.51	5.02*
Reflection can be most effectively taught or encouraged through practice of an iterative cycle of steps for problem solving.	3.21[b]	0.65	2.77[a]	0.66	2.98[ab]	0.63	6.52*
Reflection can be most effectively taught or encouraged through	3.06[b]	0.70	2.60[a]	0.72	2.65[a]	0.69	5.62*

explicit instruction of the concept.							
Reflection is a set of metacognitive activities or skills that help students understand their own thinking.	3.42	0.56	3.34	0.55	3.40	0.55	.518
Reflection involves identifying a problem.	2.55	0.71	2.60	0.67	2.75	0.73	2.16
Reflection is essential to developing students' self-regulated learning.	3.15	0.76	3.34	0.57	3.27	0.62	1.08
Reflection is essential to developing students' critical thinking skills.	3.42	0.56	3.31	0.60	3.42	0.59	.984
Reflection is essential to developing students' problem solving skills.	3.18	0.64	3.19	0.64	3.30	0.62	1.23

Source. Reflective Instruction Surveys for Teachers and Administrators (RISTA).

Notes. Mean values for items are based on a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree,* and *4 = Strongly agree*. *Wilks' lambda* = .883, $F(2, 342)$ = 2.69, p = .001. *p < .01. Means sharing the superscript letters are not significantly different from one another (Tukey post hoc, p < .05)

Reflection on Self

A one-way MANOVA was conducted by IB DP role on the reflection-on-self items. The results of the MANOVA revealed a significant difference among the three groups (*Wilks' lambd a* = .921, $F(2, 342)$ = 2.85, p = .002). Tukey post hoc results are reported for respondents' interpretation of the reflection-on-self items in Table 2. The IB DP faculty teaching a combination of IB and non-IB courses were significantly more likely than administrators to perceive that reflective thinking involves examining personal knowledge related to a problem. The mean scores of the reflection-on-self items ranged from 2.91 to 3.42, with relatively high standard deviations (0.54 – 0.78, indicating high variability in the data. Higher overall mean scores and fewer significant differences between groups on the reflection-on-self items may indicate that IB DP faculty perceptions are more strongly aligned with aspects of reflection on self, which, in turn, appears to be aligned with the IB Learner Profile description of reflective students as ones who, "thoughtfully consider the world and [their] own ideas and experience," (IBO, 2015a).

Table 2

Interpretation of Reflection on Self: Mean Level of Agreement by Role

Items	Administrators (*n* = 33)		Teachers–IB classes only (*n* = 86)		Teachers–IB and non-IB classes (*n* = 226)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*
Reflection involves experiencing new actions or insights.	3.27	0.63	2.99	0.60	3.14	0.63	2.99
Reflection can be most effectively taught or encouraged through practiced awareness of one's and others' beliefs and values.	3.12	0.70	3.13	0.55	3.20	0.63	.618
Reflection is the practice of being critically aware of personally held stereotypes and biases.	3.21	0.78	3.02	0.67	3.14	0.65	1.35
Reflection involves examining personal knowledge related to a problem.	2.91[b]	0.72	3.03[ab]	0.66	3.23[a]	0.54	6.75*
Reflection is most essential to developing students' intercultural awareness and tolerance.	3.42	0.71	3.27	0.62	3.24	0.62	1.18

Source. Reflective Instruction Survey for Teachers and Administrators (RISTA).

Notes. Mean values for items are based on a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree,* and *4 = Strongly agree*. *Wilks' lambda* = .921, *F*(2, 342) = 2.85, *p* =.002. **p* < .01 Means sharing the superscript letters are not significantly different from one another (Tukey post hoc, p < .05).

Qualitative data to address this research question were also collected from responses to open-ended questions on the *RISTA.* One question asked respondents to share aspects of their individual interpretations of reflective, not captured by the close-ended questions. The unrestricted nature of this question was deliberately selected to encourage participants to explore and examine the construct in a way that that could not be encapsulated by closed-ended questions. An inductive analysis of the data revealed several themes across participants' responses.

Metacognition. The first major theme to emerge from participant responses concerned metacognition or knowledge about one's own thinking. One respondent explained, "Reflective thinking refers to having a critical view about your own thinking. Therefore it refers to having a pragmatic view of what

works and does not work for you in your thinking skills." A second participant expressed, "Reflection is a metacognitive skill that helps students change their mentality, perception, and attitude," while a third stated, "Reflection can involve analysis of one's learning strategies and actions with an eye to improvement over time." Respondents also described reflection as "An overall sense of the work in progress or work that has been completed," "A personal assessment of the cognitive process that leads to a solution," and "Essential to taking responsibility for one's own learning and being accountable for the process." A final participant, who believed that reflection "helps all students," concluded, "Reflection is a most important component for any level student to achieve a high level of thinking skill."

Looking back. The second theme to emerge was identified as looking back*,* as illustrated by the following responses: "Reflection is the process of looking back and humbling oneself free of judgment to monitor ideas, practices, skills, or concepts being developed," "Reflection is indicative of motions or actions done and then looking back on those with reference to possible future actions or motions, and "Reflection involves examining the past actions of self and others through a critical lens, often with the intention of shaping future actions as a result." A final respondent described reflection as "a self-assessment tool," that would encourage students to ask themselves, "What did [I] learn about the topic or [myself] in CAS and other classes?"

Concern for others. The third theme was identified as concern for others*.* This theme is associated with the IB focus on educating students to have strong academic, social, and emotional traits (IBO, 2015b). One survey respondent explained, "The essential value of reflection is to consider how one's own thinking might impact the health and welfare of other people—for good or ill." Other respondents stressed the importance of reflection in learning to appreciate the unique qualities of others. One teacher, for example, asserted, "[Reflection is] being aware of the world around you and learning to appreciate each other's differences," and a second teacher agreed, saying, "Reflection includes awareness and understanding from the perspective of others." A final respondent elaborated thus: "It's not just awareness of other people's positions, beliefs, values, etc. that matters—kids need to work to come to understand and respect those differences even if they don't agree with them."

Teaching reflection. The fourth theme to emerge from the data concerned teaching reflection. Some respondents shared their opinions regarding how to best teach their students to be reflective thinkers, offering comments such as the following: "Reflective thinking is hard for a lot of IB students to grasp initially. They seem to learn it best through examples and practice," "Reflection can most effectively be taught through peer to peer discussions," and "Reflection can be most effectively taught with the combination of the first 4 statements [on the *RISTA*], plus, an open space and enough time for the individual to use for the purpose." Several believed that teacher modeling was an important component of teaching reflection to their students. "Reflection is surprisingly difficult for many students and is best taught through teacher-modeling of the process," said one, and a second concurred: "Reflection is also an essential characteristic for instructors, who must model it in their classrooms." Reflection was also seen as "very helpful for the improvement of daily teaching." One respondent opined, "It helps teachers to improve teaching," while a second believed, "Feedback from reflection can also improve the teacher's material and approach, and student-teacher relations."

A few respondents, however, expressed that it was challenging to teach reflection, particularly to students whose home lives did not typically encourage the practice:

> IB students more often come from families who engage in thinking things through, sharing opinions, problem solving as a more natural part of their lives. I find it difficult to teach kids how to write reflectively who do not have the family or educational background for discussion, thinking things through, respecting opinions, and differing opinions.

Other challenges described in regard to teaching reflection included the amount of time necessary to teach the concept, as explained by one participant: "Academic settings tend to hope there will be reflection but rarely build into their structures the time and opportunities to actively practice reflection. Reflection is an active process."

Reflection as problem solving. Reflection as problem solving was the final theme to emerge from the data. Some respondents took exception to the primary focus of some of the survey questions on reflection as a problem-solving strategy. "Reflection is not just used for identifying problems. It is also for identifying what was performed correct *[sic],*" said one, and another respondent agreed: "Reflection does not have to involve identifying a problem. Reflection can merely be the evaluation of a process to identify areas that can be adapted." One participated explained that the process of reflective thinking might entail examining a problem, but not necessarily:

> Reflection is any stopping and thinking about anything—what you just did, what you just said, what happened over the last four years, what happened last week, what we learned last week. It might have to do with a problem; it might not have to do with a problem. It might have to do with something you didn't know was a problem.

Another participant believed that although identification of a problem was not necessarily essential for reflection, the process of reflection could be an effective tool for problem-solving: "I'm not sure what you mean by 'problem,' so I don't know if identifying a problem is a necessary step in reflection. Self-reflection does lead to effective problem-solving, however." Finally, one participant warned about negative repercussions if reflection were taught primarily as a problem-solving strategy:

> Reflection CAN'T be required. It can barely be assessed. But it CAN be encouraged and practiced. It CAN be used to solve problems, but that's really an after-effect. It that's taught as the main reason for doing it, everybody will end up being disappointed.

Research Question 3: In What Ways Do Survey Participants (IB DP Teachers and Administrators) Support Reflection?

Respondents to the RISTA were asked 17 questions related to their perceptions of ways in which instruction in DP classes in their individual schools supports student reflection. Because DP

administrators at many schools have taught, or continue to teach, DP courses, both teachers and administrators were presented with the items. All items were scored on a 4-point Likert-type measure with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree*, and 4 = *Strongly agree*. One-way MANOVAs were conducted by IB Diploma Programme role (administrator, faculty teaching IB courses only, and faculty teaching both IB and non-IB courses) on the items measuring respondents' instructional support for reflective thinking.

In order to analyze survey respondent perceptions of reflective instruction, we conducted a preliminary, exploratory factor analysis that resulted in 5 factors with Eigenvalues greater than 1.0 that accounted for 57.44% of the variance. Similar to the items measuring interpretation of reflection, inspection of the factor loadings for the individual survey items for instruction did not yield interpretable factors.   We therefore constructed two scales based on the broad themes from which the survey questions were drawn: (a) instructional practices primarily focused on connecting to the beliefs of self or peers and changes that result from those connections (Boud & Walker, 1998; Schön, 1983) and (b) instructional practices primarily focused on connecting to activities and experiences (Davis, 2003; Flavell, 1979; Lim, 2011). Four reverse-scored items (numbers 14, 15, 16, and 34) were removed from analysis because they focused on habitual action, rather than reflective instructional practices. Internal consistency reliability of the scales was calculated using Cronbach's alpha. The reliability of the two factors was .77 and .73 respectively. Similar to the reflection-on-cognition and reflection-on-self scales for the interpretation items, the instructional scales also had a moderate inter-scale correlation of 0.638, which indicates that the two scales overlap to a moderate extent. As noted previously, this overlap could be attributed to some extent to the general overlap in how reflection is defined in research.

One-way MANOVAs were conducted by IB DP role (administrator, faculty teaching IB courses only, and faculty teaching both IB and non-IB courses) on the two factors, connecting to beliefs of self or peers and connecting to experiences and activities, to determine if statistically significant differences existed between the three groups' interpretations of instructional support of reflective thinking in their individual schools and classrooms.

Connecting to Beliefs of Self or Peers

A one-way MANOVA was conducted by IB DP role on the connecting to the beliefs of self or peers items. The results of the MANOVA revealed no statistically significant difference among the three groups (*Wilks' lambda* = .939, $F(2, 334)$ = 1.51, p = .10).   Mean scores and standard deviations of the items are reported in Table 3. The mean scores of the connecting to beliefs of self or others items ranged from 3.10 to 3.36, indicating less variability in respondent perceptions of reflection as a process involving making transformative connections to self and others.

Table 3

Instructional Practices Related to Connecting to Self or Peers by Role

	Administrators (*n* = 33)		Teachers—IB classes only (*n* = 86)		Teachers—IB and non-IB classes (*n* = 226)	
Items	*M*	*SD*	*M*	*SD*	*M*	*SD*
Students in my DP classes are encouraged to question the way others do something, as a basis for changing their own practice.	3.24	0.52	3.08	0.62	3.16	0.55
Participation in my DP classes challenges students' firmly held ideas.	3.12	0.53	3.24	0.59	3.10	0.68
Learning in my DP classes encourages students to change the way they look at themselves.	3.12	0.44	3.22	0.62	3.11	0.64
Students in my DP classes listen carefully to the ideas of other students.	3.36	0.49	3.28	0.50	3.27	0.51
Instruction in my classes challenges students' normal way of doing things.	3.24	0.44	3.15	0.58	3.20	0.54
I often assess reflective thinking by listening to the exchange of ideas among my students.	3.20	0.58	2.97	0.68	3.15	0.61
Often during instruction in my DP classes, students discover misconceptions or faults in what they had previously believed to be right.	3.16	0.47	3.17	0.56	3.13	0.53

Source. Reflective Instructional Survey for Teachers and Administrators (RISTA).

Notes. Mean values for items are based on a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree,* and 4 = *Strongly agree*. *Wilks' lambda* = .939, *F*(2, 334) = 1.51, *p* = .10.

Connecting to Activities and Experiences

A one-way MANOVA was conducted by IB DP role on the connecting to activities and experiences items. The results of the MANOVA revealed a significant difference among the three groups (*Wilks' lambda* = .905, *F*(2, 334) = 1.66, *p* = .036). Tukey post hoc results for respondents' perceptions of reflective instructional practices that support connecting to activities and experiences, as well as mean scores and standard deviations, are reported in Table 4. The mean scores of the connecting to activities or experiences items ranged from 2.44 to 3.48. Standard deviations ranging from .04 –.16, which are lower than those of all other items on the survey. Perhaps not surprisingly, both groups of IB DP teachers (IB

only and IB and non-IB) were significantly more likely than were administrators to engage in instruction that directed students to make drawings or sketches to help them understand what they were studying. As a whole, the three groups had the highest mean scores on items related to students thinking about what they were doing as they were completing activities and assignments and to students connecting between new learning and their experiences. Lower means scores were returned by the three groups for an item proposing that reflection requires an extensive amount of time thinking over experiences related to activities. These two results may suggest that IB survey respondents perceive reflection to be an active process, where students are reflecting on work as it is being completed, rather than thinking back on activities or experiences once they have occurred. This view is in line with Schön's idea of reflection-in-action (1987), in which participants consider an activity, their knowledge related to the activity, and changes in their knowledge as an activity is being completed.

Table 4
Instructional Practices Related to Connecting to Activities or Experiences, by Role

Item	Administrators (*n* = 33)		Teachers–IB classes only (*n* = 86)		Teachers–IB and non-IB classes (*n* = 226)		
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*
Students in my DP classes are encouraged to think about what they are doing in order to complete activities or assignments.	3.48	0.11	3.40	0.06	3.48	0.04	.811
I provide students in my DP classes with opportunities to think over their experiences in order to learn from them.	3.28	0.11	3.48	0.06	3.37	0.04	1.796
Instruction in my DP classes requires extensive time spent thinking over experiences related to the activity.	2.88	0.13	2.71	0.07	2.82	0.04	1.119
I instruct my students to make drawings or sketches to help them understand what they are studying.	2.44[b]	0.16	2.91[a]	0.09	2.99[a]	0.05	5.130*
I encourage my DP students to find connections between	3.52	0.11	3.55	0.06	3.46	0.04	.868

Item							
what they are learning and their own experiences.							
I often assess reflective thinking by evaluating the extent to which students are able to make connections between what they are learning and applications of what they are learning to their everyday life.	3.20	0.13	3.15	0.07	3.21	0.04	.286
Students in my DP classes are taught to think through an assignment to decide what they are supposed to learn from it rather than just reading over it when studying.	3.28	0.12	3.20	0.07	3.19	0.04	.249
I often assess reflective thinking by evaluating a DP student's synthesis of ideas in a summary written in the student's own words.	3.04	0.15	3.00	0.78	2.99	0.05	.098
I instruct reflective thinking in my DP classes by encouraging students to follow a study schedule.	2.80	0.15	2.61	0.08	2.73	0.05	1.204
When a long-term project is assigned in my DP classes, part of the assignment is a timeline with interim tasks and deadlines identified.	3.28	0.13	3.09	0.07	3.10	0.04	1.034

Source. Reflective Instruction Survey for Teachers and Administrators (RISTA).

Notes. Mean values for items are based on a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree,* and 4 = *Strongly agree*. *Wilks' lambda* = .905, $F_{(2, 334)}$ = 1.66, p = .036. *$p<.01$. Means with the same superscript are not significantly different from one another (Tukey post hoc, $p < .05$).

Research Question 4: Which IB DP schools, based on survey results, best exemplify successful support of reflective thinking?

The IB Learner Profile includes 10 attributes of IB learners: Inquirers, Knowledgeable, Thinkers, Communicators, Principled, Open-minded, Caring, Risk Takers, Balanced, and Reflective. The final question on the *RISTA* asked respondents to consider the degree of emphasis their individual Diploma Programme places on each of the 10 IB Learner Profile attributes, using a 5-point scale with 1 = *No emphasis*, 2 = *Little emphasis*, 3 = *Some emphasis,* 4 = *Moderate emphasis,* and 5 = *A great deal of emphasis*. A one-way MANOVA was conducted by IB DP faculty role on the programmes' emphasis on the Learner Profile attributes. No statistically significant differences were found in perceived programme emphasis on the Learner Profile attributes by faculty role (*Wilks' lambda* = .945, $F(2, 332)$ = .921, p = .561.). These findings indicate that although there do appear to be some differences in perceived levels of emphasis placed on different Learner Profile attributes by survey respondents in different roles, the respondents collectively are not significantly different from one another with regard to Learner Profile emphasis.

Both teachers and administrators perceived that their DP placed moderate to high levels of emphasis on most of the 10 Learner Profile traits. Teachers teaching IB courses only, teachers teaching IB and non-IB courses, and administrators all believed *Thinkers* to be the most emphasized attribute (*M* = 4.76, SD = .50, *M* = 4.72, SD = .48, and *M* = 4.64, SD = 0.62 respectively), with *Reflective* having the sixth highest mean score for all three groups (*M* = 4.30, SD = .64, *M* = 4.20, SD = .73 and *M* = 4.27, SD = .75 respectively). Table 5 depicts the mean scores and standard deviations of programme emphasis on Learner Profile attributes by faculty role.

Table 5
Diploma Programme Emphasis on IB Learner Profile Attributes

Learner Profile attribute	Administrators (*n* = 33)		Teachers—IB classes only (*n* = 86)		Teachers—IB / non-IB classes (*n* = 226)	
	M	SD	*M*	SD	*M*	SD
Thinkers	4.76	0.50	4.72	0.48	4.65	0.62
Knowledgeable	4.52	0.62	4.48	0.59	4.47	0.66
Communicators	4.48	0.67	4.49	0.73	4.50	0.68
Inquirers	4.45	0.67	4.67	0.54	4.54	0.65
Open-minded	4.33	0.60	4.44	0.61	4.35	0.76
Principled	4.30	0.88	4.02	0.81	3.97	0.89
Reflective	4.30	0.64	4.20	0.73	4.27	0.75
Caring	4.21	0.86	4.01	0.89	3.91	0.96
Balanced	4.09	0.95	3.92	0.92	4.00	0.84
Risk-takers	4.00	0.83	4.16	0.77	4.07	0.87

Source. Reflective Instruction Survey for Teachers and Administrators (RISTA)*.*

Note. Mean values for attributes are based on a 5-point scale, with 1 = *No emphasis*, 2 = *Little emphasis*, 3 = *Some emphasis,* 4 = *Moderate emphasis,* and 5 = *A great deal of emphasis*. Mean scores and standard deviations for Learner Profile attributes are ranked from highest to lowest in order of administrator mean score.

As part of the selection process for the case study sites, we also examined the overall mean score of each school in regard to perceived emphasis on the attribute reflective. As shown in Table 6, the mean scores demonstrated a range in the different schools' support of reflection, with mean scores ranging from a low of 3.62 to a high of 4.67. Schools with a mean score of 4.30 or above were identified as more engaged with reflective instruction as implied by their self-rating of this item. Schools that were eventually chosen as case study sites included schools 3, 5, 20, 24, 25, and 27. More information regarding the site selection process is provided in the next section of the report.

Table 6
Emphasis Placed on the IB Learner Profile Attribute, Reflective, by School

	N	M	SD
School #1	11	4.18	0.75
School #2	8	3.62	0.74
School #3	19	4.58	0.61
School #4	8	4.50	0.54
School #5	9	4.56	0.73
School #6	13	4.08	0.86
School #7	12	4.42	1.00
School #8	20	4.35	0.59
School #9	9	4.22	0.83
School #10	16	4.44	0.73
School #11	12	3.75	1.22
School #12	10	4.00	0.47
School #13	4	4.25	0.50
School #14	12	4.33	0.49
School #15	14	4.29	0.61
School #16	3	4.67	0.58
School #17	8	4.25	0.71
School #18	8	4.25	0.71
School #19	3	4.00	1.00
School #20	12	4.33	0.89
School #21	13	4.15	0.38
School #22	10	3.70	0.48
School #23	7	3.86	1.07
School #24	20	4.50	0.61
School #25	13	4.54	0.66
School #26	10	4.20	0.63
School #27	14	4.36	0.63
School #28	10	3.80	1.14
School #29	26	4.35	0.63
School #30	4	3.75	0.50
School #31	6	4.33	0.52

Source. Reflective Instruction Survey for Teachers and Administrators (RISTA).

Note. Mean scores were calculated using a 5-point scale, with 1 = *No emphasis*, 2 = *Little emphasis*, 3 = *Some emphasis*, 4 = *Moderate emphasis*, and 5 = *A great deal of emphasis.*

Research Question 5: To what extent do students at individual case study sites exhibit reflective thinking?

Research Question 6: In what ways do the teachers and administrators at the case study sites foster, instruct, integrate, and/or assess students' reflective thinking?

Research questions 5 and 6 were addressed through in-depth case studies of the six Diploma Programmes chosen as case study sites for this study. Teams of researchers completed 2-day site visits at the six schools in spring 2015. Quantitative and qualitative data were collected at each site via structured classroom observations, surveys of DP students, and semi-structured interviews with teachers and administrators affiliated with the DP in any capacity. Individual case narratives were developed for each case study site, with pseudonyms assigned to schools and respondents in order to protect participants' confidentiality to the fullest extent possible.

Classroom observations. In order to determine to what extent teachers at individual case study sites foster, instruct, integrate, and/or assess students' reflective thinking, researchers calculated mean scores and standard deviations for both sections of the OFIBP instrument (Appendix B), including (a) teachers' general instructional practices and (b) student behaviors and activities. The OFIBP was completed at the end of each observation and measured the extent to which certain effective instructional strategies were demonstrated during a class period on a 3-point scale (1 = *Not observed*, 2 = *Observed to some extent*, and 3 = *Observed to a great extent*). In addition to analyzing OFIBP mean scores and standard deviations for each case study site, researchers also analyzed mean scores and standard deviations from the reflective instructional practices section of the TROS–IB (Appendix C) for each site. The TROS–IB data were collected during classroom observations in which each teacher was observed once, for six to ten 30-second intervals during the classroom observation. Researchers alternated between formal data collection intervals using the TROS–IB and informal field notes throughout each observation period. The field notes provided contextual information for the classrooms observed. Comparative analyses of the scales between sites can be found in the cross-case analysis. It should be noted that the findings for each school may be limited by the short-term nature of data collection using the TROS-IB.

DP student surveys. The DP students aged 18 and over at each case study site were administered a paper-and-pencil version of the 16-question IB–STRQ during the site visit. After all student questions regarding the research study and the survey were answered, students who chose to participate in the study gave their assent and completed the survey anonymously. Administrators at one case study site opted to obtain parental consent for students younger than 18, in order for them to take the survey as well.

Adapted from the RTQ (Kember et al., 2000), the IB–STRQ utilized the four scales from the original RTQ: *habitual action*, *understanding*, *reflection*, and *critical reflection*. The first scale, *habitual action*, includes rote activities that one can complete by memory. *Understanding*, the second scale, refers to situations in which one understands something without relating it to other situations (Bloom, 1979). During *reflection*, the third scale, one actively, carefully, and persistently considers one's beliefs and knowledge "in the light of the grounds that support it and the further conclusion to which it tends" (Dewey, 1933, p. 9). Finally, during *critical reflection*, the final scale, one begins to consider why one thinks as one does and may change beliefs as a result of an experience. Table 7 provides the 16 questions from the IB-SRTQ, organized by scale.

Table 7

IB–SRTQ Scale Items

Item	Scale
When I am working on some DP course activities, I can do them without thinking about what I am doing.	Habitual action
In my DP courses, we do things so many times that I sometimes do them without thinking about it.	
As long as I can remember handout material for examinations, I do not have to think too much.	
If I follow what the teachers say, I do not have to think too much in my DP courses.	
Our DP courses require us to understand concepts taught by the teachers.	Understanding
To pass a DP course, you need to understand the content of the course.	
I need to understand the material taught by my DP teachers in order to perform practical tasks.	
In DP courses, you have to continually think about the material you are being taught.	
I sometimes question the way others do something and try to think of a better way.	Reflection
I like to think over what I have been doing and consider alternative ways of doing it.	
I often reflect on my actions to see whether I could have improved on what I did.	
I often re-appraise an experience so I can learn from it and improve for my next performance.	
As a result of my DP courses, I have changed the way I look at myself.	Critical reflection
My DP courses have challenged some of my firmly held ideas.	
As a result of my DP coursework, I have changed my normal way of doing things.	
During my DP coursework, I have discovered faults in what I previously believed to be right.	

In order to determine to what extent students at individual case study sites exhibit reflective thinking, researchers calculated means and standard deviations for each of the four scales from the IB–SRTQ (Appendix D)*): habitual action* (HA), *understanding* (U), *reflection* (R), and *critical reflection* (CR). The 16-item survey, adapted from Kember et al. (2000), asked DP student to indicate the extent to which they agreed with statements, using a 4-point scale, with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree,* and *4 = Strongly agree*. A scale score was calculated as a sum of the points for each scale, resulting in a scale score from 0 to 16. Mean scores and standard deviations for each of the scales are discussed below for each site. Comparative analyses of the scales between sites can be found in the cross-case analysis.

DP teacher and administrator interviews. Qualitative data for the in-depth case studies were collected during semi-structured interviews (Appendix E) with teachers and administrators affiliated with the DP at each case study site. We began the inductive analysis of the qualitative data by reading and re-reading each interview multiple times. As we read, we marked phrases and passages that we considered interesting or important in the context of our research objectives, trusting our judgment regarding the significance of the selected passages and our experience in internalizing and interpreting interview data (Seidman, 2006).   In the next phase of the analysis, we assigned codes to the data bits, recording working definitions of the codes in a code list. We next sorted and re-sorted the coded data bits into categories or families (Saldaña, 2013) using a constant comparison method to examine data within and across categories (Goetz & LeCompte, 1984). We performed this process inductively, allowing categories to emerge from participants' own words, rather than beginning with a hypothesis or theory to substantiate. The meaningful passages thus sorted and categorized formed the nucleus of the narrative text that was written to provide an in-depth discussion related to the evaluation questions. As we wrote, we remembered always that the thick, rich description so critical for a qualitative study depends on an accurate interpretation of a participant's own words.

Case Study Site Selection

The original research proposal for the current study called for researchers to utilize the success case method (Brinkerhoff, 2005) to identify 4–6 IB schools that had successfully integrated instruction of the attribute reflective, along with 2–3 IB schools that had been less successful, for a multiple case study analysis. The success case method is a model of evaluation that identifies and explains the difference between performers who are successful in a particular area and those who are less successful. Studies utilizing the success case method follow a specific research process: (a) define a purpose of the study; (b) identify what success should look like (i.e., literature review); (c) design and administer a brief survey based on the performance attributes identified in the literature review to the targeted performers (e.g., IB DP administrators and teachers); (d) conduct case studies of success cases and non-success cases; (e) analyze the case studies to identify perceptions, patterns, and environmental supports facilitating or inhibiting success; and (f) make conclusions and recommendations in the form of in-depth examples of success (Brinkerhoff).

The RISTA was designed, in part, to determine which schools fit the criteria for successful and which fit the criteria for less successful. Due to low response rates in general, and site-specific response rates as

low as *n* = 3 at some sites, the research team was unable to use inferential statistics, such as MANOVAs, to determine if statistically significant differences existed between sites. In addition, because of the multi-faceted nature of reflection uncovered in the literature search, the survey items were designed to distinguish between various interpretations of the reflective process. An overall mean score representing one's view of reflection, therefore, would not be a meaningful reflection of the data.

Researchers therefore determined to use the mean scores of each site's rating of the amount of emphasis placed on the IB Learner Profile attribute, reflective, to identify which schools appeared highly engaged with reflective learning and teaching practices and those that appeared less so. The final question on the RISTA asked survey respondents to indicate the degree of emphasis their DP places on each of the 10 IB Learner Profile attributes, including reflective, using a 5-point scale with 1 = *No emphasis*, 2 = *Little emphasis*, 3 = *Some emphasis, 4 = Moderate emphasis, and 5 = A great deal of emphasis*. Schools with a mean score of 4.30 or above were identified as higher performing and those with a mean score of below 4.0 were designated as lower performing.

Researchers began contacting the schools chosen as potential case study sites in fall 2014. Although all sites that initially participated in the survey agreed to the possibility of a potential case study site visit, acceptance rates diminished when it came time to schedule visits. The schools invited to participate as case study sites recognized the value of the study, but many noted other demands on teachers' time and school resources that made participation in a site visit difficult, if not impossible for the spring 2015 semester. Site visits were scheduled with four of the six schools identified as having a higher emphasis on reflective thinking: three in the US and one in Canada. Researchers were not successful, however, in scheduling site visits at any of the four "lower emphasis on reflective" schools.

Due to these obstacles, the research team determined to recruit additional case study sites at schools that met the criteria for greater reflective emphasis. An additional three schools with a mean score of 4.50 or higher were contacted and invited to participate as case study sites, and two of the schools accepted, for a total of six sites. Despite this alteration, the study's design and framework still focus on the underlying logic of Brinkerhoff's success case method (2005).

New Haven High School

Located in a mid-western state, New Haven High School is a 4-year, comprehensive high school of approximately 330 students and a student/teacher ratio of 20:1. New Haven offers the IB Diploma Programme, an IB Middle Years Programme, and the Advanced Placement (AP) program, and its students must each complete 25 hours of community service per year. In addition to its focus on academic rigor and an international curriculum, New Haven has a strong reputation for its contribution to the arts in the area. New Haven was established as the state's first public charter high school in 1992, and in 2014, *US News & World Report* ranked it as one of the top charter schools in the country. A team of researchers from the Education Research Center conducted a 2-day site visit in February 2015.

Classroom observations. Researchers observed 19 classrooms at New Haven High School across all DP subject groups, including mathematics, sciences, language and literature, language acquisition, individuals and societies, and the arts. The school is located in several buildings in the downtown area of the city, and classrooms were a variety of sizes and configurations. Although some were equipped with SMART Board® technology or projectors of some kind, technology use by teachers or students was not frequently observed at this site. Following the observation, researchers rated the extent to which each instructional variable on the OFIBP was observed, using a 3-point scale: 1 = *Not observed*, 2 = *Observed to some extent*, or 3 = *Observed to a great extent*. Of the 24 instructional practices observed on the OFIBP, New Haven teacher mean scores were higher than were the overall case study site mean OFIBP scores for 18 of the 24 instructional practices. Table 8 compares New Haven's OFIBP mean score for each instructional variable with the corresponding OFIBP overall case study site mean score. Highlighted variables in Table 8 are those for which the New Haven OFIBP mean score was higher than the overall mean score of all case study site observations. (Highlighted variables do not indicate statistical significance.)

Table 8

New Haven OFIBP Mean Scores Compared to Overall Case Study Site Mean Scores

Instructional practice	New Haven mean scores (n = 19)		Overall mean scores (n = 97)	
	M	SD	M	SD
Engaged students	2.16	0.96	1.81	0.87
Explored concepts	2.11	0.88	1.86	0.83
Explained new learning	2.05	0.85	1.83	0.83
Elaborated on new learning	1.58	0.90	1.41	0.64
Evaluated learning	2.42	0.84	2.26	0.78
Connected ideas/concepts	1.95	0.91	2.02	0.84
Initiated experiences/discussions	2.32	0.82	2.24	0.85
Acted as coach/facilitator	2.16	0.96	2.02	0.89
Allowed students to develop concepts	2.00	1.00	2.12	0.85
Provided options for problem solving	1.26	0.56	1.37	0.72
Provided feedback	2.63	0.68	2.31	0.73
Assisted students to organize thinking	1.95	0.85	1.71	0.81
Assisted students to generalize thinking	1.74	0.87	1.54	0.73
Integrated technology in lesson	1.53	0.77	1.79	0.85
Integrated feedback/assessment	2.42	0.77	1.95	0.79
Distributed feedback evenly	2.00	0.94	1.85	0.86
Redirected student thinking	1.95	0.78	1.56	0.70
Began with students' prior knowledge	1.95	0.78	2.07	0.90

Provided opportunities for students to assume responsibility	2.00	0.94	2.05	0.89
Assisted students in applying learning to outside world	1.42	0.77	1.34	0.66
Varied activities according to student preferences	1.42	0.77	1.33	0.69
Varied style of conversation for students	1.32	0.67	1.07	0.33
Provided opportunities for students to learn about global environment	1.42	0.84	1.38	0.72
Provided opportunities for students to develop creativity	1.74	0.99	1.38	0.76

Source. Observation of Features of International Baccalaureate Programs (OFIBP).

Note. Values for observation items based on a 3-point scale with 1 = *Not observed*, 2 = *Observed to some extent*, and 3 = *Observed to a great extent*.

Instruction was driven by teacher questioning and instructional feedback in many of the classrooms observers visited. Teachers prompted students to explain their thinking to others with comments such as "What's your process?" or "Go further with that." Humanities, arts, and mathematics classes were particularly collaborative in nature, with teachers functioning in the role of facilitator more often than as direct instructor. In contrast to the humanities-focused and mathematics classes, the science classes observed tended to be more lecture-driven and exam-focused. Coursework in several of these classes involved students taking lecture notes, with teachers sometimes pointing out the application of concepts to upcoming exams.

The TROS–IB was used to systematically document observed reflective instructional practices throughout the class period. Mean percent scores for the reflective instructional practices were calculated as follows: The number of 30-second observation intervals in which a reflective instructional practice was observed was divided by the total number of observation intervals (10 intervals in most cases). Mean percent scores between zero and 10 indicate that a practice was infrequently observed (i.e., observed, on average, in one 30-second interval), whereas mean percent scores higher than 10 indicate that practices were observed, on average, in more than one 30-second interval. As noted previously, given the short term nature of our data collection these results may be anecdotal and not necessarily generalizable at each case study site.

New Haven teachers *solicited multiple perspectives on topics* about 20% of the time. This was particularly evident in a language acquisition class in which students were presenting in Spanish about healthy foods. Both the teacher and other students questioned the student presenters about their ideas, in Spanish, thus requiring all students to focus concurrently on the material and on correct use of the language of instruction. Instructors, particularly in humanities and mathematics classes, were observed helping students *connect new material to previously learned material* about 20% of the time, asking students questions such as "What do we know today that we did not know before?" High standard deviations in the data indicate a large degree of variability in the observed practices, which

may reflect the short term, as opposed to longitudinal, nature of data collection using the TROS-IB. As illustrated in Table 9, New Haven reflective instructional practice mean percent scores were higher than the overall case study site reflective practice mean percent scores for all of the variables observed.

Table 9

New Haven Reflective Instructional Practice Mean Percent Scores Compared to Composite Mean Percent Scores

Reflective instructional practice	New Haven mean percent scores (*n* = 19)		Composite mean percent scores (*n* = 97)	
	M	*SD*	*M*	*SD*
Connect content to other disciplines	0.53	2.29	0.31	1.74
Connect content to global communities	6.84	18.27	5.15	19.32
Solicit multiple perspectives on topic	22.63	36.03	11.65	25.77
Encourage students to collaborate	7.89	22.99	3.81	13.88
Encourage students to question their own ideas	7.89	8.55	4.23	9.34
Encourage students to listen to others' ideas	8.42	23.40	3.51	14.07
Encourage students to question others' ideas	5.56	23.57	1.88	12.42
Encourage students to explain their ideas to others	15.26	26.32	8.35	19.46
Provide time for students to reflect	15.26	21.70	10.62	21.50
Encourage extended student responses	21.58	25.88	7.94	17.07
Model thinking for students	13.68	17.39	5.57	12.50
Emphasize intrinsic value of task(s)	3.68	11.65	1.13	5.57
Highlight main/important points	25.79	28.93	18.53	23.21
Connect new material to previously learned material	20.00	25.17	7.84	17.09

Source. Teacher Roles Observation Schedule–IB (TROS-IB).

DP Student Surveys. A total of 26 DP students were surveyed at New Haven High School. As shown in Table 10, New Haven students showed lower levels of agreement with the habitual action items than the composite mean score, indicating that New Haven students were slightly less likely than students at other sites to perceive their DP courses as requiring repetitive actions rather than reflective thinking. New Haven students' mean scale scores for understanding, reflection, and critical reflection were higher than composite mean scores, indicating New Haven students perceived that their DP courses required slightly more understanding and reflection on processes and thinking than students at other sites. New Haven students' perceptions of the levels of reflection required by their DP courses followed the same trend as the overall sample, with the highest mean on the understanding scale, followed by reflection and critical reflection, and the lowest mean on the habitual action scale.

Table 10

New Haven IB–SRTQ Mean Scale Scores Compared to Composite Mean Scale Scores

Scale	New Haven mean scale scores (*n* = 26)		Composite mean scale scores (*n* = 205)	
	M	*SD*	*M*	*SD*
Habitual action	7.96	0.36	8.86	1.88
Understanding	13.88	0.33	13.31	1.69
Reflection	13.70	0.37	12.37	1.89
Critical reflection	12.08	0.44	11.95	2.21

Source. IB Student Reflective Thinking Questionnaire (IB-SRTQ).

Note. Mean scores were calculated using a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree,* and 4 = *Strongly agree*. A scale score was calculated as a sum of the points for each scale, resulting in a scale score from 0 to 16.

Participant interviews. As part of the site visit at New Haven High School, researchers interviewed 19 administrators and teachers who were involved, in various ways, with the campus IB Diploma Programme. Participants' overall teaching experiences ranged from less than 1 year to "more than 40" years and experience in any IB program, at any level, ranged from less than 1 year to 9 years. Interviews were conducted in participants' classrooms during their planning time and lasted about 25 minutes each. Although the questions on the interview protocol established the focus and structure of the interview, participants were encouraged to expand and elaborate on their responses. Interviews were audiotaped for later transcription, and the interviewers took meticulous notes for later examination and consideration.

Mr. Lucas teaches mathematics and TOK in the Diploma Programme at New Haven High School and is also the IB coordinator. He has been a classroom teacher for "about 22 years," 9 of which have been in the IB program at New Haven. Lucas believes the IB experience for him began with IB training and understanding what the expectations are for students, "understanding that IB is holistic in nature, so you're not just preparing them to take a test, you're preparing them to think. . . .A lot of IB teaching is about helping the student find his or her own voice."

Lucas was a member of the first cohort of IB teachers when the school became a candidate school. He attended "sort of a pre-training" to write the SL math curriculum and then attended math SL and HL training, as well as TOK training (twice), IB coordinator training, and training to learn how to "interconnect" CAS, EE, and TOK: "So, yeah, a lot of training." Although Lucas said he had never attended any IB training that was specifically called "IB Learner Profile training," the training "that was geared towards connecting the core" included the IB learner attributes.

To Lucas, a reflective person is willing to learn from his or her mistakes and successes. Moreover, someone who is reflective is "sort of doing a little bit of metacognition and is able to not just perceive the world in terms of what they need out of it. . . .They can make connections or be aware that there's not just them in the world." Lucas has several white boards in his classroom, and he usually has his

students work problems on the board rather than on paper, as a strategy for encouraging reflective thinking:

> Watching them work a problem, stepping back and seeing where things went awry. That's a strategy that I employ every day in the classroom. It's easier to step back and look at things when it's written large than when it's small, and you're kind of hovering over it. To be reflective, it's great for everybody to be able to see what's going on and kind of get a perspectival *[sic]* approach to the work. So that's certainly a strategy that I use. They write on their desks, they write on the boards, they write big, we're all looking at it.

Lucas sees his students exhibiting reflecting thinking in the classroom when they examine and correct their work. The seniors, particularly are "naturally at a state of quite a bit of reflection," developing their resumes and collecting letters of recommendation as they move through the college application process: "They are very reflective about what they've been doing . . .assessing the past, moving towards the future."

Lucas believes the teachers and administrators at New Haven "really are helping to make a better world through education," and reflective is a "huge part" of the holistic nature of the DP at the school. The affective impact of the IB Learner Profile provides a framework in which to achieve that: "It's important and it's an important part of what we do and why we do it here at New Haven High School."

Ms. Hayes teaches French in the DP at New Haven and is also the extended essay coordinator for the school. She has been teaching IB French for 5 years and has been a classroom teacher for 6 years overall. Hayes has "really enjoyed" teaching IB French because the curriculum is flexible and fun for the students. She explained that the recommendation of the program is to use the target language the maximum amount of time, and "The kinds of tasks that we ask the students to do, having actual conversations and doing real world tasks in the language, it just—it's how I prefer to teach anyway, so it just has been a nice fit."

Hayes attended initial IB training and "sort of the next level, updated training." She left New Haven for a period of time, and when she returned, the syllabus had changed and she received training on the new syllabus. Some of the other trainings Hayes attended "weren't directly related to French," such as training regarding the extended essay, but "that maybe helped me get more familiar with the IB program, in general." She noted that the Learner Profile was referenced in some of the training she attended, but "It was mostly focused on getting us to understand all of the jargon and what the different parts of the test are, what things are assessed in class versus out of class. . . the nuts and bolts of it."

Hayes initially defined reflective thinking as helping the students become aware of their learning, rather than just doing something because it was assigned. After thinking for a moment, she elaborated:

It's helping them to be aware of their own learning styles and strategies and progress. . .It has to do with them taking responsibility for their own learning, too, you know—that they recognize it's not just showing up and doing what the teacher says or not. . . .It goes beyond the "fill in the blank" attitude of education.

At New Haven, all of the foreign language classes are taught in complete immersion from Level 1 onward, so all the discussion has to be done in the target language. Hayes asserted that this often makes it difficult to have deep discussions, although she tries to ask complex questions: "I try to ask hard questions, or questions that require them to be reflective, even if they're not capable of expressing all the detail of that back to me in French." Hayes believes, however, that her students are thinking deeply, and it becomes easier for them as they become more fluent in the language. She finds that one-on-one conferences with the students, where they examine the student's work together and the student makes revisions and returns to share them, provide the best opportunities for her to assess whether her students are being reflective.

For Hayes, the best opportunity to see her students exhibiting reflective thinking is during small group discussions in class. She generally has the students discuss in small groups first, to give everyone a chance to contribute, and "Then I can see that some of the kids who are shier or not as good at French, that they're engaging with the topic a little more and being more reflective about it." Hayes explained that in terms of assessing students' understanding of reflective thinking, she looks for students to express something—"maybe something more personal about their own experience of the topic, you know, not just information but kind of what the experience of that activity was like for them."

When asked about the benefits of reflective and reflective thinking for her students, Hayes explained that reflective thinking increases one's self-awareness, which makes one less likely to make assumptions about other people and about complex topics. She summarized by musing that if she can help her students to become more reflective in their thinking, they are more likely to recognize the limitations of their knowledge, to be tolerant and open-minded, and a good, informed citizen: "You can't be open-minded and tolerant if you're not reflective on your own position in the world."

Ms. Gibson teaches chemistry, physics, and TOK in the Diploma Programme at New Haven High School. She has 16 years of experience as a classroom teacher, 8 of which are in the IB program. She explained why she had been one of the original proponents of bringing the IB program to New Haven:

My method for teaching is to teach people how to think, how to learn, and I believe that the IB way of testing, and what they want the students to know, caters to that. If a student can learn to think, then they're going to be successful on IB exams, and that's basically all that I do in class, is show them how to learn, then they tend to be pretty successful.

Gibson attended several lB training events before and during her first year of teaching in the program at New Haven. She found that it was "very different" to talk with people who had "real life experience" in the IB versus what she had read about the program: "The hands-on learning from educators who had

already been in the program was really beneficial to me, and it made me believe that the school was making a—a good choice." Since those first workshops, Gibson has attended training for the internal assessments and science content training for the new science curriculum, as well as other workshops: "They start to blur together when you've had so many." She noted that all of the IB trainings that she has attended have addressed reflective, primarily because "they want you, as an educator, to reflect on what you've done, what you've accomplished, and they also require the students to reflect on any knowledge that they have incoming, so that that they're learning how to make connections."

Gibson's interpretation of reflective was that educators and students absorb material and then reflect upon it, to increase their understanding and "real knowledge." Students learn more knowledge about the material, and teachers gain more knowledge about how to teach. To integrate reflective thinking into her instruction, Gibson requires students to complete an exercise—a lab or an assignment—and then reflect on it and try to make connections to concepts and terminology from other classes and units. Students then share and compare their perspectives with those of other students: "To me it's a really good method of getting them to first internalize and reflect, and then to find out how others did the same thing, because they always learn."

Describing her teaching method as "roaming," Gibson explained that she wandered around the classroom watching the students as they reflected on the process of a mathematical problem, requiring that they write their reflections to share with her. She teaches chemistry and physics, and she believes it's important that her students understand the mathematical concepts "that go along" with mastering those two subjects: "If you just work problems, methodically work problems, then you learn how to work that problem. But if you learn how to reflect on an equation, then you really learn how to answer a lot of problems."

One of the ways Gibson frequently observes her students naturally exhibiting reflective thinking is when they complete their labs—connecting the material in the textbook to what happens in the lab. It's sometimes difficult for them to make those connections, "but if they've learned to reflect on it before they got there, if they've reflected on that equation and all the possibilities for it, then they actually have an easier transition to the lab."

Gibson concluded by describing reflection as a "powerful tool," one that will support their ability to unconsciously analyze situations, if they practice it consistently:

> Without reflection on a regular basis. . .a student is not going to gain true knowledge. They may collect facts and figures, they may have some memorized data in their brain, but until that reflection takes place and that information in the brain is tied together, they're not going to have true knowledge.

Ms. Jeffrey teaches 11th and 12th grade IB English at New Haven. She has "more than 25" years of experience as a classroom teacher, 9 of which were spent teaching in IB programs in the US and abroad. Jeffrey likes the international aspect of the IB program and the fact that "it really does look at the whole

child." She feels very comfortable teaching the subject matter, and at New Haven, "I just feel like I'm home." Jeffrey has attended several content specific IB workshops for English literature, and for the most part, the trainings were "excellent." She actually began her IB career outside the US in an MYP school, and she transitioned easily in the DP. At most of her trainings there was an introduction to the Learner Profile attributes, but "nothing very specific."

According to Jeffrey, superficial reflection comes naturally to most people. They may look at a paper and think about what they did well or didn't do well and how they could improve, but true reflection goes beyond that: "The attribute goes beyond that to really kind of think, you know, of metacognition, think of myself as a thinker, as a learner. . .that can really help us, when we—we understand our strengths and weaknesses." Jeffrey integrates reflective thinking in her classes through journaling, with students reflecting on changes in their attitudes, and the students reflect on concepts in the different literature they read: "Sometimes it comes out verbally, sometimes it comes out in writing. . . .It's very built into my subject area; I don't know about other subject areas. She also does frequent small group assignments that encourage reflection, such as think/pair/share.

In regard to assessing students' reflective thinking, Jeffrey's students complete a reflective statement as part of their IB requirements. Otherwise, she assesses them through class discussion and their journal writing. Jeffrey finds that some students reflect very naturally, but for some, "It's a completely foreign concept. . .and they're not really willing to go through that process." She pointed out that New Haven students represent a wide range of religions, cultures, and socio-economic factors, but she feels she's been successful in creating an atmosphere "where students feel comfortable being able to say, 'You know, I didn't get this,' and some else being able to put their two cents worth in."

When asked about the benefits of reflective and reflective thinking for her students, Jeffrey confessed there were times when she didn't want to make the effort to reflect but if she did, she always "came out on the other side" with a better lesson plan or a better idea of what worked and what didn't. Her hope is that her students will realize the benefits of reflective thinking, and become "even better students and, I think, human beings, even though it takes more time, it takes effort, it's not easy—and for some people, it's not natural."

Mr. Cameron teaches 11th grade HL biology in the DP at New Haven High School. At the time of the interview, he was completing his first year as a classroom teacher and first year in an IB program. Cameron said his experience in IB has been "wonderful," in part because of the content he is expected to teach. It's been challenging because he's a first-year teacher, "but it's also rewarding work."

Prior to starting the school year, Cameron attended a DP workshop in St. Petersburg, FL, where he was introduced to the IB program. That is the only formal IB training he has received so far, but he has "a lot of support" from the other teachers in the DP and from the administration.

Cameron defined reflective as students taking the time "to digest' what they're taught and then using it in their coursework or their assignments or in the way they interact with others in the class. He believes

reflective thinking also can inspire his students "to do things differently," and he tries to encourage them "to reflect on what they're learned, not just keeping it to the textbooks, but then also taking it to their lives."

Cameron assigns "mini-projects" to help integrate reflective thinking into his instruction, trying to help students connect what they're learning in class to what is happening in the world. His students had just finished a unit on DNA on the day of the site visit, and researchers saw many students in the hallways carrying DNA models constructed from Lego block, cubes of sugar, and Styrofoam balls. Cameron assesses his students' reflective thinking through mini-quizzes that he assigns them every day, composed of questions that he hopes will make them think and then apply that thinking to the questions:

> So if this is happening, why is this? So that makes them think about the whys and wherefores rather than just, you know, the vocabulary words, or the three points that are in transcription or the five points that are in replication. That is the bookish knowledge that you—if you open a book you're going to find. But then the questions that I ask make them think about, "Why should it be like this or why is this happening?"

For Cameron, his students reveal that they are thinking reflectively through the questions that they sometimes ask. He compared the experience to seeing a light bulb go on over a student's head, when s/he suddenly makes a connection: "I wouldn't say it happens all the time, but when it does happen, it makes me feel happy."

Cameron believes that it's important for biology students to reflect, because it's a life science. When they learn about the effects of different food on their bodies, perhaps they'll remember that when they go to lunch, or when they learn about exercise and how it's good for the human body, perhaps they'll integrate exercise into their lives. Acknowledging that for his students, it's currently all about how to pass the test and how to graduate, Cameron mused that the skills students learn now are "going to help them reflect throughout their lives."

Mr. Hathaway teaches junior HL1 English in the Diploma Programme at New Haven High School. He has 10 years of experience teaching overall and was completing his first year in the IB program at the time of the interview. Hathaway said that he finds teaching in the DP to be somewhat challenging because it's a new class and he hasn't taught it before, but "content wise and what I'm asked to do, I really enjoy. I like getting the kids to think on a higher level, write about the works that we're choosing."

Hathaway attended an IB workshop in 2007 when the school was first adopting the IB program, and he attended a second over the previous summer before he began teaching the class. He usually leaves the IB workshops "feeling like I never have enough time to read everything that they give me, and I want to, so I read what I have time to." Hathaway collaborates with the other IB English teachers in the department, and he has one colleague who previously taught the class and is especially helpful.

Hathaway defines reflective as "a trait we want to encourage in students that allows them to examine their own habits, skills, strengths, weaknesses, and attempt to make changes to target those places." Connecting the definition to his own practice, Hathaway reflects on his teaching, asking himself what he is doing well and what he is not and what he can do differently in order to have different results. Hathaway described a strategy he had employed earlier in the year, in which he had recorded his students giving a poetry presentation. He then asked them to write a paper, in which they examined their presentations and reflected on how they could make them better. Hathaway's students also have a reflective component in the portfolios students do at the end of the year in which they reflect on their growth in writing. He said some of his students were fantastic at the skill, but "Some of them don't really want to put the effort into it. But I find that if they do it, and I make them write enough, then they eventually are making good observations about it."

According to Hathaway, the primary way he assesses his students' reflective thinking is through the essays they write, whether the level of self-analysis they demonstrate is superficial or critical. In his directions, he tells his students, "I'm looking now for critical thought on yourself or critical thought on your own work." Hathaway also sees his students exhibiting reflective thinking during conversation or class discussions, and all students in the English department are frequently asked to revise essays they write, "and there's reflection kind of wrapped up in that component."

Hathaway believes there are many benefits of reflective thinking for his students. He sees his role as the teacher is to pay attention to the things the students reflect upon and then remind them on later projects, what weaknesses they had identified earlier. In conclusion, Hathaway posited that the process of reflection holds them accountable: "They do change and they do get better. They—they start to feel more confident, and they always have something new to critique themselves on."

Ms. Kizer teaches 11th and 12th grade history in the Diploma Programme at New Haven High School. At the time of the interview she was completing her second year as a K-12 teacher, which was also her second year of teaching in an IB program; previously, she had taught college. Kizer described her experience in the DP as challenging, but satisfying. The IB curriculum reflects her personal philosophy of teaching history, and she feels that she is providing her students with a "pretty well-rounded preparation for college."

Prior to becoming a teacher in the IB program, Kizer attended introductory IB training in New York at the United National International School. In the time since then she has also completed the online TOK training. The Learner Profile was specifically addressed in both.

When asked to define or interpret reflective, Kizer promptly responded, "Considering oneself in relation to the world, past and present. . . .I guess that's a history-focused response, but that's how I see it." To encourage her students to think reflectively, Kizer tries to verbally recreate a historical circumstance, such as World War I or working in a textile factory in the 1800s, outlining the options that people had available to them. She then asks her students to imagine and discuss the choices people had in these situations: "Help them understand why people did what they did ad behaved as they did. Empathy, I

guess, without siding with one or another view." To assess their understanding of the reflective process, Kizer then has students give presentations on the specific situation.

For Kizer, students exhibit their capacity for reflective thinking through their emotional responses to historical events discussed in class:

> Especially if we do sensitive topics, like the Holocaust or things—things like that, you can see the emotional responses to it, and you can see them thinking about the suffering that went on or what they would do in that situation, and often there's a shock value that you see, you know, oh, surprised students.

Kizer concluded by expressing that reflective thinking is crucial in order for her students to understand history. He noted that we all have our own beliefs and values, but one can't understand history through those: "I think being reflective creates empathy, which then tends to achieve a higher understanding of historical phenomena."

Spring Creek High School

Located in a large southeastern state in the US, Spring Creek High School is a 4-year comprehensive high school with a student population of over 2,000 students. In addition to the IB Diploma Programme, Spring Creek offers the College Board Advanced Placement (AP) program, a Dual Enrollment program, a gifted education program, an Air Force ROTC program, and a Technical Center that allows students to learn professional/industrial skills. Foreign languages offered at Spring Creek include French, Spanish, and Mandarin Chinese. A team of researchers from the Education Research Center conducted a 2-day site visit in March 2015.

Classroom observations. A total of 17 classrooms were observed at Spring Creek High School across all DP subject groups, including mathematics, sciences, language and literature, language acquisition, individuals and societies, and the arts. A TOK class was also observed. The DP classrooms are spread throughout a large high school, with a large portion clustered in one wing of the school. Most classrooms configurations consisted of individual student desks placed in rows. Many classrooms had projectors of some kind.

Following the observation, researchers rated the extent to which each instructional variable on the OFIBP was observed, using a 3-point scale with 1 = *Not observed*, 2 = *Observed to some extent*, or 3 = *Observed to a great extent*. Of the 24 instructional practices observed, nine were observed with greater frequency at Spring Creek than in the overall sample of classrooms. In many of the classrooms visited, teachers were observed providing feedback to students, either on exams, projects, or portfolios. In several cases, feedback on student work was tied to preparation for upcoming IB exams. Student work at Spring Creek was generally student-directed, with teachers facilitating instruction through feedback rather than direct instruction. Instruction often began with exploration of students' prior knowledge, such as in the case of one mathematics classroom where students were looking back over exams to

decide how they would solve problems differently. The OFIBP mean scores for instructional practices for the classrooms observed are reported in Table 11. Highlighted variables in Table 11 are those for which the Spring Creek *OFIBP* score was higher than the overall mean score for all case study sites. (Highlighted variables do not indicate statistical significance.)

Table 11

Spring Creek OFIBP Mean Scores Compared to Overall Case Study Site Mean Scores

Instructional practice	Spring Creek mean scores (*n* = 17)		Overall mean scores (*n* = 97)	
	M	SD	*M*	SD
Engaged students	1.41	0.80	1.81	0.87
Explored concepts	1.94	0.97	1.86	0.83
Explained new learning	2.12	0.99	1.83	0.83
Elaborated on new learning	1.24	0.44	1.41	0.64
Evaluated learning	2.29	0.85	2.26	0.78
Connected ideas/concepts	2.41	0.87	2.02	0.84
Initiated experiences/discussions	2.24	0.97	2.24	0.85
Acted as coach/facilitator	2.00	1.00	2.02	0.89
Allowed students to develop concepts	1.94	0.97	2.12	0.85
Provided options for problem solving	1.18	0.53	1.37	0.72
Provided feedback	2.76	0.56	2.31	0.73
Assisted students to organize thinking	1.88	0.78	1.71	0.81
Assisted students to generalize thinking	1.41	0.71	1.54	0.73
Integrated technology in lesson	1.76	0.90	1.79	0.85
Integrated feedback/assessment	1.94	0.90	1.95	0.79
Distributed feedback evenly	1.65	0.93	1.85	0.86
Redirected student thinking	1.47	0.62	1.56	0.70
Began with students' prior knowledge	2.59	0.80	2.07	0.90
Provided opportunities for students to assume responsibility	2.18	0.95	2.05	0.89
Assisted students in applying learning to outside world	1.24	0.56	1.34	0.66
Varied activities according to student preferences	1.18	0.53	1.33	0.69
Varied style of conversation for students	1.06	0.24	1.07	0.33
Provided opportunities for students to learn about global environment	1.18	0.53	1.38	0.72
Provided opportunities for students to develop creativity	1.18	0.53	1.38	0.76

Source. Observation of Features of International Baccalaureate Programs (OFIBP).

Note. Values for observation items are based on a 3-point scale with 1 = Not observed, 2 = Observed to some extent, and 3 = Observed to a great extent.

Reflective instructional practices mean percent scores at Spring Creek were higher than composite reflective practice mean percent scores for five of the variables observed, including *connecting content to global communities*, *encouraging students to explain their ideas to others*, *modeling thinking for students*, *highlighting main points, and connecting new material to previously learned material* (see Table 12). Teachers encouraged students to explain their ideas to others about 12% of the time by prompting students with questions such as "What is your process there?" or "Do y'all [*sic*] hear what [student] said over here?" In one case, a teacher was overheard modeling her thinking for students and then subsequently apologizing for interrupting the students' group thinking process, saying, "I'm talking too much. I'll let you be." Similar to observations at other sites, humanities and mathematics classes observed at Spring Creek included student reflection on their work, while the science courses observed were more teacher-directed, overall. Teachers in the science classes observed were lecturing or working problems, while students took notes and/or worked problems along with the teacher. Table 12 details the reflective instructional practice mean percent scores for Spring Creek compared to the composite mean percent scores. Highlighted rows in Table 12 indicate Spring Creek mean percent scores that were higher than composite mean percent scores. High standard deviations in the data reflect a large degree of variability in the observed practices.

Table 12

Spring Creek Reflective Instructional Practices Compared to Composite Mean Percent Scores

Reflective instructional practice	Spring Creek mean percent scores (*n* = 17)		Composite mean percent scores (*n* = 97)	
	M	SD	*M*	SD
Connect content to other disciplines	0.00	0.00	0.31	1.74
Connect content to global communities	5.88	24.25	5.15	19.32
Solicit multiple perspectives on topic	10.59	28.17	11.65	25.77
Encourage students to collaborate	3.53	10.57	3.81	13.88
Encourage students to question their own ideas	4.12	8.70	4.23	9.34
Encourage students to listen to others' ideas	1.76	3.93	3.51	14.07
Encourage students to question others' ideas	0.00	0.00	1.88	12.42
Encourage students to explain their ideas to others	12.94	21.44	8.35	19.46
Provide time for students to reflect	8.82	22.61	10.62	21.50
Encourage extended student responses	1.76	3.93	7.94	17.07
Model thinking for students	8.24	16.67	5.57	12.50
Emphasize intrinsic value of task(s)	0.00	0.00	1.13	5.57
Highlight main/important points	25.29	22.11	18.53	23.21

Connect new material to previously learned material	12.35	23.59	7.84	17.09

Source. Teacher Roles Observation Schedule–IB (TROS-IB).

DP student surveys. As illustrated in Table 13, Diploma Programme students surveyed at Spring Creek High School identified most strongly with statements on the scale measuring understanding. In contrast to the composite mean score for critical reflection, Spring Creek students exhibited higher levels of agreement with statements focused on critical reflection than statements focused on reflection. This indicates that Spring Creek students were more likely to perceive their DP courses as resulting in changes to their personal beliefs or ideas about what they might have previously believed to be true than statements focusing on things such as re-appraising experiences or actions.

Table 13

Spring Creek IB-SRTQ Mean Scale Scores Compared to Composite Mean Scale Scores

Scale	Spring Creek mean scale scores (n = 30)		Composite mean scale scores (n = 205)	
	M	SD	*M*	SD
Habitual action	8.10	1.32	8.86	1.88
Understanding	13.67	1.42	13.31	1.69
Reflection	11.87	1.59	12.37	1.89
Critical reflection	12.37	1.92	11.95	2.21

Source. IB Student Reflective Thinking Questionnaire (IB–SRTQ).

Note. Mean scores were calculated using a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree, 4 = Strongly agree*. A scale score was calculated as a sum of the points for each scale, resulting in a scale score from 0 to 16.

Participant interviews. As part of the site visit at Spring Creek High School, researchers interviewed 17 administrators and teachers who were involved to some extent, with the campus IB Diploma Programme. Participants' overall teaching experiences ranged from less than 4 years to ~40 years and experience in any IB program, at any level, ranged from less than 1 year to ~21 years. Interviews were conducted in an empty classroom in the school and lasted about 25 minutes each. Although the questions on the interview protocol established the focus and structure of the interview, participants were encouraged to expand and elaborate on their responses. Interviews were audiotaped for later transcription, and the interviewers took meticulous notes for later examination and consideration

Ms. Donahue is the IB coordinator at Spring Creek High School. She has 18 years of experience in the IB program and years of experience in K-12 teaching overall. Donahue began in the IB program as an 11th grade IB history teacher.   She had taught in the AP program previously, but she found the IB program to be different: "This was more encompassing of everything. I was able to go into more depth, and the students were more motivated." Her experience as the IB coordinator has been "a rollercoaster— There's been some ups, there's been some downs." One of her goals as coordinator has been to make sure the program does not become an "elitist" program for the wealthier students.

Prior to becoming an IB teacher, Donahue attended IB history training in New Mexico. As an IB history teacher, she attended IB history training every time the curriculum changed. In the years since, she has attended IB regional conferences and workshops and IB coordinator training, and the teachers at Spring Creek work collaborative to increase their professional learning about IB.

For Donahue, reflective means learning from the past: "You know, going back and looking at your mistakes, going back and trying to see what we learned from that. . .whether it be looking at data or okay, this didn't work, this did, maybe enhancing what did work." When she was an IB history teacher, Donahue integrated reflective thinking into her teaching with Socratic Seminars, analysis of primary documents, and panel discussions. "I just tried to teach them to think." Donahue assessed her students' understanding of reflective thinking mostly through writing assignments.

As IB coordinator, Donahue sees the DP students exhibit reflective thinking through their CAS journals, which she reads: "I'll ask them, what they thought about before and what did they learn about this, what did they learn about themselves." She noted that the students are aware of their own strengths and weaknesses and are quick to admit to them. Donahue believes that for the DP students, reflective thinking is the only way for them to become better people: "How can you get better if you don't go back and reflect? And I tell them. . .What can you do tomorrow to make—you know, to make tomorrow better than it was yesterday."

Mr. Ricci teaches 11th grade American History at Spring Creek High School. He has 26 years of experience in K-12 teaching, 11 of which have been in the IB program at Spring Creek. Ricci shared that he hadn't been familiar with the IB program before he was hired at Spring Creek. The past 11 years have been "an evolution" for him, with a "great IB faculty" that are just like a family.

Ricci received some IB training in his early years at Spring Creek, but he doesn't remember whether it occurred during the summer before his first or the summer after. He also attended an IB workshop in St. Petersburg, FL, and his IB cohort at Spring Creek meets "often but irregularly" to discuss IB related topics.

According to Ricci, being reflective, for his students, means they are able to examine past experiences and relate to future events. As an example, he shared that when the junior students recently returned from a class trip to New Orleans, Ricci asked them to "be reflective on how to make the trip better. In other words, how do we make next year's group—how do we solve some of the problems?"

Ricci incorporates reflection in his instruction primarily through the writing that students complete. He uses a rubric to evaluate students' essays, but "Overall, it isn't an entirely reflective rubric." Ricci sometimes sees his students exhibiting reflective thinking through sharing "personal aspects of their own family or experiences." For example, he shared that the class had been studying the Panama Canal on previous, and one students had actually spent 7 hours in the Canal: "[He] explained his experiences

within the canal and being locked in there and trapped in there for hours. To me, that's the students using history to reflect back on personal experiences."

Ricci believes that reflective thinking is beneficial to his students in that it provides opportunity for the students to experience higher-level thinking and share it, either verbally or in written form. Unfortunately, most of his non-IB students haven't developed that skill: "You're lucky if you can get some reflective aspects out of kids that aren't in the IB program." For his IB students, however, "They have that ability and they're not afraid to share."

Ms. Baldwin teaches IB French 3 and 4 at Spring Creek High School. At the time of the interview she was completing her 11th year of teaching in the IB program and her 17th year of teaching overall. Baldwin shared that she has "fallen in love with the IB program, as far as French is concerned. . . . I think it's absolutely incredible. . .as far as what IB does with languages," in that students are allowed to creatively demonstrate what they do with the language.

Baldwin received no IB training prior to transitioning to the IB program—she just "had to dive in." In her first year she taught French 1 and French 2, attended an IB workshop in the summer, and then began teaching DP students in her second year. Since then Baldwin has attended IB training for languages twice, and her IB cohort meets to talk about test taking strategies and things they can do to help the students be successful in the program.

For Baldwin, reflective can be defined as "looking at everything that you've gleaned over your entire study of the language. . . .and preparing for future work and making sure that—that you're continuing on a path to success, based on what you've already done. " She integrates reflective thinking in her instructional strategies primarily through writing; her students write multiple drafts of each writing assignment, using the rubric to assess their work. Sometimes they use peer editing as an additional tool. Baldwin then assesses the students' understand of reflective thinking by applying the IB rubric to their drafts, looking to see how well they have edited their work.

Baldwin believes that in a language class, "everything just kind of builds up," and if the students are reflective across the courses, they develop a good base in the language. Reflective thinking has to be taught, however, and modeled in the classroom, and it "only serves to enhance their—their writing and speaking, obviously, when they've practiced that throughout the course of the year.

Ms. Van Hassel teaches History of the Americas in the Diploma Programme at Spring Creek High School. At the time of the interview she was completing her 4th year in the DP and her 27th year as a classroom teacher.   Van Hassel confessed that she still felt "fairly new" in the DP, but the experience had been very positive: "I have very good students and I like the topics." The IB program allows her to "develop into the topic in a deeper way" than she had been able to in her previous experience teaching non-IB history courses.

Van Hassel did not receive IB training prior to accepting a position in the IB program, but the IB coordinator had "really mentored" her in her first year. She has since attended one IB workshop, and the IB teachers and IB coordinator meet and discuss "pretty regularly." Van Hassel couldn't remember if the IB workshop had included a discussion of the Learner Profile and the attributes of an IB learner; a tropical storm had interrupted the workshop and disrupted the schedule.

As a history teacher, Van Hassel defines reflective in terms of cause and effect: "These events occurred, these things happened, and then how are they going to either affect or change when we get down the road." She explained, for example, that her class was just completing a study of the Treaty of Versailles, which "kind of segues into World War II." Van Hassel integrates reflective thinking into her instructional strategies via reviewing at the beginning of class and summarizing at the end: "I usually have them do just simple cause and effect kind of like, fish tails. Just simple little things like that."

Van Hassel primarily assesses her students' understanding of reflective thinking through their writing or through the reflective questioning at the beginning or end of class. The "fun part about teaching" for her, however, is when the students exhibit reflective thinking by making connections among past and current events and perspectives. She believes that for the DP students, the benefits of reflective thinking are especially strong in a history class:

> I think that they can see a pattern. . . .that maybe, this is something that we should not have done. . . .And I just think it gives them a sense of—of where mistakes have been made and—and what thinking at that time might have driven that decision. And it may not have been wrong at that time, but if you look at the consequences, that's—that's a bigger picture.

Mr. Coke teaches biology in the Diploma Programme at Spring Creek High School. He has 9 years of experience in K-12 teaching, 4 of which have been in the IB program at Spring Creek. According to Coke, his experience in the DP has been very positive: "I mean, you deal with higher level students. The curriculum was changed this year, so it's hard to teach old curriculum and new curriculum at the same time, but I mean, other than that, it's been a good experience." Although he didn't receive formal IB training until he had been teaching in the DP for 6 months, "I was trained by the former IB teacher and she did a very good job training me."

Since his first year, Coke has attended the Level 2 IB biology training, which was "really good training," and since the curriculum has just changed, he will attend training for the new curriculum in the upcoming summer. The Learner Profile and the 10 attributes of an IB learner was "mentioned" at a workshop he had attended in the past. A PowerPoint was provided to use in introducing the attributes to the students, but "they didn't really go over the attributes other than that."

Coke defines reflective in two ways: reflective for the students and reflective for him. For the students, "It's kind of reflecting on how they've done." For him, "When I'm being reflective, I'm going back and thinking about what I've done well or what I need to improve on." Coke integrates reflection into his instruction in several ways. First, he has the students complete a teacher evaluation, which gives them a

chance to reflect on his teaching, his promptness in grading, etc. Sometimes, for an exit ticket, he has students complete what he calls "a CLR": a quick memo in which they identify something they're *confused* about, something they *learned*, and something they're *reflecting* on for improvement. The only other "big reflection thing" is the Group 4 reflection paper. Coke assesses the students' understanding of reflective through the exit tickets and their reflection paper.

In closing, Coke listed three benefits of reflective thinking for his students: It allows (a) students to assess where they currently are, (b) how they may currently be improving, and (c) what they need to improve on.

 Ms. Millett teaches senior English in the Diploma Programme at Spring Creek High School. She has "about 20 years" of experience teaching in the IB program and 38 years of experience in teaching overall. Millett began her IB teaching career in the junior English course and later switched to the senior course. She also taught TOK for about 10 years and has been an assessor for TOK and for English. Millett described her experience in the IB program thus: "It's been fabulous! It's been absolutely wonderful!"

According to Millett, the IB professional development she has received over the years has been "wonderful." She originally trained at the New World College in Montezuma, NM, for English, and returned the next summer to train for TOK. Millett has also attended TOK training three times in St. Petersburg, FL, and attended a recap for World Literature in Montezuma. The last TOK training she attended addressed the Learner Profile.

Millett defines reflective as any time students are asked to go back and evaluate their performance on an assignment or task: "It's one of the things that I think marks adulthood and maturity, that you have the ability to go back and look at strengths and weaknesses and make changes where they're necessary." She noted that she had been very specific in the current year, in her strategies to integrate reflective thinking into her instruction. Providing them with a rubric, asked them to score themselves on their readiness for their oral exams and their World Literature essay: "I think if they learn the rubric, they will perform to the rubric." Millett also believes that reflection is particularly important in the language arts:

> In working with the literature, we get to reflect on what values are being—being promulgated in the literature, that we either take exception to, or that are new to us, or that we identify with. After all, that's why we read the classics. It's why we read great literature.

Millett assesses her students' understanding of reflective by comparing how they score themselves on the rubric to how she scores them: "If they come pretty close to what I think they did, that's a very good reflection." The "most fun" indication of her students exhibiting reflective thinking, however, is when they come to class on Monday after watching a movie over the weekend: "'Ms. Millett, I couldn't watch that movie because I kept analyzing that character! That character just was—was very shallow, not much integrity.' When they reflecting all the time, it's contagious—it becomes a habit. "

In Millett's opinion, the greatest benefit of reflective is that it "enhances critical thinking skills" and is one of the necessary characteristics of maturity. She concluded her interview thus:

> I would want somebody to be a reflective thinker before they vote, for example. I mean, that's—to me, that's an—that is absolutely a normal and natural expectation for a good citizen of the United States, is to be reflective. Does this candidate really represent what I think and what I believe? And I would hope that reflective thinking would be in every classroom throughout the country.

Ms. Schmidt teaches physics and mathematics in the Diploma Programme at Spring Creek High School. She has 21 years of experience in K-12 teaching, 17 of which have been in the IB program. Schmidt loves the DP "because it's high level material." A lot of her students want to be engineers, and she tells them that engineering programs lose 50% of their students because of the physics or mathematics. She's confident, however, that her DP students will be successful because of IB's high standards for DP physics and mathematics.

Prior to beginning in the IB program, Schmidt attended IB training in Baltimore that was "an eye-opening experience." She felt the training was more effective, however, after she had taught IB and attended the next workshop, but the first workshop introduced her to the idea "of how much material there was and the level of the material." Since then Schmidt has attended IB content workshops every 6 years, when the syllabus changes, and she has attended other professional development in New Orleans and St. Petersburg. The IB teachers and the IB coordinator meet fairly regularly for informal professional development as well. Schmidt has attended IB workshops where the Learner Profile and the attributes of an IB learner were "talked about in general," but that's the extent of her training in regard to the Learner Profile.

Schmidt defines reflective as understanding oneself as a learner: "That's mostly what I get out of reflective learning. You know, how did I learn that? What could I do better to learn more? Should I do flashcards? Should I, you know, talk with people? Join a study group?" She turns that idea around on her students, asking them what she can do as a teacher, to help them learn easier or more. Schmidt integrates reflective into her instruction by encouraging the students to reflect on their own learning and be honest in their feedback to her in regard to her teaching: "Because the kids can—kids will tell you. They will let you know what's working and what's not working." She also collaborates with other IB and AP physics teachers, and uses the OCC forum as a resource for her teaching.

To Schmidt, one of the best strategies to integrate reflective thinking in her classes is to encourage students to talk to each other about what they're doing as they solve a problem: "I'm like, get in your study groups, talk about it. . . .Not just, you know, copying someone's work—because they don't—they talk to each other, ask them how they did that." She knows her students are developing their reflective skills when they can solve complex problems that require multiple steps, and justify how they did it:

"They see the problem, but then they can do the math side of it and explain the English side too. We don't like the explaining part. We're math people, we want to show the math. But justify your answer."

Schmidt believes her physics students exhibit successful reflective thinking when they reach the point that they're more interested in understanding the process than in reaching the correct answer:

> I just step back. I'm listening to them, and they're teaching it to each other, and they're talking about it, and, "Why—well, why did you do it that way?". . . .They don't just want to copy the answer. They're like, "Well, wait, how did you do that?"

For Schmidt, reflective thinking is a "huge benefit" to her students. Her students are already reaching levels in physics that she struggled to reach in college physics: "I think being a reflective learner, or reflective on their learning, is helping them progress to a level where this material—they can do it."

Alexander Hamilton High School

Located in a mid-Atlantic state in the US, Alexander Hamilton High School is a 4-year comprehensive high school with a student population of almost 2100 students. In addition to an IB Diploma Programme and an IB Middle Years Programme, Hamilton offers Advanced Placement (AP) for its higher achieving students and an Advancement Via Individual Determination (AVID) program, which provides support to its students who are in the academic "middle." Foreign languages offered in the curriculum include Chinese, Arabic, French, Spanish, and American Sign Language (ASL). A team of researchers from the Education Research Center conducted a 2-day site visit in March 2015.

Classroom observations. The research team observed a total of 18 classrooms at Alexander Hamilton High School across all DP subject groups, including mathematics, sciences, language and literature, language acquisition, individuals and societies, and the arts. A Theory of Knowledge class (TOK) was also observed. Classrooms were mostly large, well lit, and equipped with SMART Board® technology or projectors of some kind.

Students worked collaboratively in the majority of classrooms visited, in several instances on project-based topics that appeared to be of their own choosing. Socratic seminars were observed in a few language and literature, language acquisition, or individuals and societies classes, where students questioned one another regarding a common text. Students in these classes were observed asking thoughtful questions of one another, often incorporating specific aspects of a previous student's response. In contrast to the humanities-focused classes, the mathematics and science classes observed by researchers tended to be more exam-focused. Coursework in several of these classes involved students working on test preparation problems. The majority of the classrooms observed were collaborative in nature, with both teachers and students questioning and assisting one another. In several cases, students focused their work on individual projects while teachers conferenced with other students about their progress towards learning goals.

The OFIBP instructional practice mean scores for the Hamilton classrooms observed are reported in Table 14. On the whole, the OFIBP mean scores for teachers observed at Hamilton were higher than the overall case study site mean scores for 7 of the 24 instructional practices, including *engaging students*, *elaborating on new learning, allowing students to develop concepts, providing options for problem solving, varying activities according to student preferences,* and *providing opportunities for students to learn about the global environment.* Highlighted rows in Table 14 indicate instructional practices for which Hamilton mean scores were higher than the overall mean scores of all case study sites. (Highlighted variables do not indicate statistical significance.)

Table 14

Hamilton OFIBP Mean Scores Compared to Overall Case Study Site Mean Scores

Instructional practice	Hamilton mean scores (n = 18)		Overall mean scores (n = 97)	
	M	SD	M	SD
Engaged students	2.00	0.71	1.81	0.87
Explored concepts	1.76	0.66	1.86	0.83
Explained new learning	1.76	0.44	1.83	0.83
Elaborated on new learning	1.59	0.51	1.41	0.64
Evaluated learning	1.82	0.53	2.26	0.78
Connected ideas/concepts	1.88	0.70	2.02	0.84
Initiated experiences/discussions	2.29	0.77	2.24	0.85
Acted as coach/facilitator	1.82	0.73	2.02	0.89
Allowed students to develop concepts	2.18	0.64	2.12	0.85
Provided options for problem solving	1.71	0.85	1.37	0.72
Provided feedback	2.18	0.39	2.31	0.73
Assisted students to organize thinking	1.24	0.44	1.71	0.81
Assisted students to generalize thinking	1.35	0.49	1.54	0.73
Integrated technology in lesson	1.59	0.62	1.79	0.85
Integrated feedback/assessment	1.76	0.44	1.95	0.79
Distributed feedback evenly	1.82	0.64	1.85	0.86
Redirected student thinking	1.47	0.51	1.56	0.70
Began with students' prior knowledge	1.47	0.72	2.07	0.90
Provided opportunities for students' to assume responsibility	1.88	0.70	2.05	0.89
Assisted students in applying learning to outside world	1.24	0.44	1.34	0.66
Varied activities according to student preferences	1.71	0.85	1.33	0.69
Varied style of conversation for students	1.00	0.00	1.07	0.33

Provided opportunities for students to learn about global environment	1.47	0.72	1.38	0.72
Provided opportunities for students to develop creativity	1.24	0.56	1.38	0.76

Source. Observation of Features of International Baccalaureate Programs (OFIBP).

Note. Values for observation items were based on a 3-point scale with 1 = *Not observed*, 2 = *Observed to some extent*, and 3 = *Observed to a great extent*.

More than half of the reflective instructional practice mean percent scores at Hamilton were higher than the composite mean percent scores (see Table 15). Highlighted rows in Table 15 indicate practices for which Hamilton mean percent scores were higher than the composite mean percent scores. Hamilton teachers were observed *highlighting main or important points* about 18% of the time, while a *global focus* was evident in several of the classrooms observed. Instruction was focused on students answering broad questions about topics such as the viability of a two-party democratic state and whether or not people can truly rely on their own ways of knowing. Students reflected on one another's comments, saying things such as, "I agree with [student] and [student] because. . ." Although teachers were not often observed soliciting multiple perspectives on topics, students freely offered their opinions on issues without being asked to do so. Similar to other case study sites, high standard deviations in the observation data indicate a large degree of variability in the reflective instructional practices observed.

Table 15

Hamilton Reflective Instructional Practice Mean Percent Scores Compared to Composite Mean Percent Scores

Reflective instructional practice	Hamilton mean percent scores (*n* = 18)		Composite mean percent scores (*n* = 97)	
	M	SD	*M*	SD
Connect content to other disciplines	0.00	0.00	0.31	1.74
Connect content to global communities	7.22	24.21	5.15	19.32
Solicit multiple perspectives on topic	8.89	19.06	11.65	25.77
Encourage students to collaborate	3.89	16.50	3.81	13.88
Encourage students to question their own ideas	3.89	8.50	4.23	9.34
Encourage students to listen to others' ideas	3.89	16.50	3.51	14.07
Encourage students to question others' ideas	4.44	16.53	1.88	12.42
Encourage students to explain their ideas to others	9.44	23.88	8.35	19.46
Provide time for students to reflect	10.00	22.75	10.62	21.50
Encourage extended student responses	9.44	16.26	7.94	17.07
Model thinking for students	4.44	9.84	5.57	12.50

Emphasize intrinsic value of task(s)	0.56	2.36	1.13	5.57
Highlight main/important points	18.89	19.37	18.53	23.21
Connect new material to previously learned material	3.33	6.86	7.84	17.09

Source. Teacher Roles Observation Schedule–IB (TROS–IB).

DP student surveys. As Table 16 illustrates, students surveyed at Hamilton (*n* = 13) identified most strongly with the scale measuring understanding. Hamilton students' mean scale scores for reflection and critical reflection were higher than composite mean scale scores, although in contrast to the overall sample, Hamilton students exhibited higher levels of critical reflection than of reflection. Although slightly higher than the composite mean score, Hamilton students' low mean score on the habitual action scale was similar to the overall sample of students surveyed.

Table 16

Hamilton IB-SRTQ Mean Scale Scores Compared to Composite Mean Scale Scores

Scale	Hamilton mean scale scores (*n* = 13)		Composite mean scale scores (*n* = 205)	
	M	SD	*M*	SD
Habitual action	9.31	1.49	8.86	1.88
Understanding	13.31	1.55	13.31	1.69
Reflection	13.15	1.52	12.37	1.89
Critical reflection	13.23	2.17	11.95	2.21

Source. IB Student Reflective Thinking Questionnaire (IB-SRTQ).

Note. Mean scores were calculated using a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree, and 4 = Strongly agree*. A scale score was calculated as a sum of the points for each scale, resulting in a scale score from 0 to 16.

Participant interviews. As part of the site visit, researchers interviewed 17 administrators and teachers who were involved, to some extent, with the campus IB Diploma Programme. Participants' overall teaching experiences ranged from less than 1 year to 28 years and experience in any IB program, at any level, ranged from less than 1 year to 20 years. Interviews were conducted in a meeting room off the main office and lasted about 25 minutes each. Although the questions on the interview protocol established the focus and structure of the interview, participants were encouraged to expand and elaborate on their responses. Interviews were audiotaped for later transcription, and the interviewers took meticulous notes for later examination and consideration.

Mr. Fleming is the IB coordinator at Alexander Hamilton High School. Although his duties are almost exclusively administrative ones, he is classified as a teacher by the district. Fleming has 20 years of experience in the education field, nine of which as the IB coordinator at Hamilton, which he believes is "the best job" in the district:

I get to work with students from all different kinds of backgrounds and from different schools. I get to work with teachers across all of the curricular areas and I get to work with parents, and I mean, I just get to come to work every day and do great things!

Fleming was appointed as IB coordinator when the school became an IB candidate school and was able to attend both IB training in his content area and coordinator training almost immediately. At that time the district already had two authorized IB DP schools and an IB district coordinator, so Fleming received "good resources" and "a lot of support" from the beginning of his tenure. Over the last 9 years, he has attended a second IB coordinator training; level 3 trainings; extended essay, CAS, and international mindedness training; and IB coordinator professional development provided by the district.

Although none of the various professional development events Fleming has attended have focused specifically on the Learner Profile and the 10 attributes of an IB learner, he has "worked with [his] teachers to try to get them to use the 10 attributes differently," including the attribute, reflective. Noting that teachers are so pressed for time that reflection sometimes falls by the wayside, Fleming has conversations with the DP teachers about "giving students the opportunity to reflect at different times during the units or class periods." Hamilton High School recently adopted standards-aligned grading for all of the DP courses, and in meetings to prepare for the transition, teachers have had the opportunity to reflect themselves about the type of work they require from the students, how well students perform, and where students' growth areas are.

For Fleming, reflective can be interpreted in a number of ways. Reflective for students can mean taking the opportunity to make connections between what they're learning and classroom or school application. It can also be tied to performance: "How well did I do that task or that assignment? How well do I understand something?" For teachers, reflective can be part of the design cycle of idea, research, action, reflection, and more action. Fleming expressed that in an ideal classroom, the reflective component of the design cycle would "naturally lead students either to action outside the classroom as part of CAS, or it would lead to maybe, like, the next unit of study or where we're going next with the curriculum."

As the IB coordinator, Fleming regularly visits DP classrooms. Some of the ways he has seen teachers implementing strategies to integrate reflective thinking into their instruction include "exit tickets" at the end of a class, Socratic Seminars, asking students to reflect on how they think performed on a particular assignment or test, or asking students to reflect on what they learned from a unit: "I see it [reflection] happening a lot with CAS, because there's that reflection component that's built into the portfolio that they do."

Asked about strategies to assess students' understanding of reflective, Fleming expressed that the quality of students' verbal or written reflections should increase over time, if they are becoming reflective. He used CAS, in which students "come up with an idea, implement this activity, have their action, and then they're supposed to reflect on it" as an example:

So you can reflect on it [the experience] and you can say, you know, "I went to Happy Helpers for the Homeless and we made sandwiches, and, you know, I liked working with a group of people." Or you can have a reflection that, you know, talks about how you felt, talks about how you feel like you made a difference in the world, "I didn't realize there were this many homeless people living in [our city]."

One of the ways that Fleming sees the DP students exhibiting reflective thinking is when they drop by his office to share something they've learned in a class: "I can just tell, like, okay, they finally got it . . . . They've made that connection to something beyond themselves. . .and they are excited to share that information." Sometimes, Fleming realizes the students are exhibiting reflective thinking in other ways. For example, someone might tell him that they met one of his students who was a "deep thinker," or a former student may come back to visit and share his reflections on how the DP program prepared him for higher education.

In conclusion, Fleming discussed the benefits of reflective and reflective thinking for his students. For him, the DP provides students with opportunities, not only in the way they learn and the way the DP teachers ask them to demonstrate what they learn, but in the experiences they have, through the TOK and CAS—experiences that "kind of get them outsides of themselves and into the community." At the end of each school year, the DP teachers at Hamilton reflect about the graduating seniors personally, and at an assembly, each teacher talks for one minute about one of his or her students, how the teacher has seen that student grow and mature over time. "You know, it becomes really clear that night that we're dealing with, you know, amazing kids who have really grown and matured and understand, you know, their strengths, understand where they're still growing."

Ms. Wilson teaches IB Psychology in the Diploma Programme at Alexander Hamilton High School, among other, non-IB courses. Although she has 12 years of experience in K-12 education, Wilson was completing her first year as an IB teacher at the time she was interviewed for this study. She had been a testing coordinator for the previous 3 years and was happy to be back in the classroom. She shared that teaching IB Psychology was proving to be a good experience: "The kids want to be there, they want to learn, they have an interest in psychology, so it's been really fun. . . .We get to have a lot of discussion and a lot of, you know, thoughtful thinking."

Although Wilson had received no training to prepare her for the transition to an IB classroom prior to beginning her assignment, she had since attended several half-day workshops for IB and AP teachers in the district. Because the workshops had included both AP and IB teachers, however, the focus had been on "just techniques to use in the classroom" and the Learner Profile "wasn't really discussed much." One workshop, however, focused on Socratic Seminars and how to encourage reflection after a Socratic Seminar.

Wilson defined reflective as an opportunity for students to "look back" and assess what they had learned. She noted that psychology was a good class in which to encourage reflection, because her students were experiencing or had already experienced many of the topics discussed in class. For

example, when discussing the developmental process, students had been able to reflect on their own development and discuss that. When the topic of discussion was relationships, "They have a lot to reflect on, with friendships and boyfriend/girlfriend relationships, and things like that. In psychology, there's a lot to be able to reflect on, so there's a lot of class discussion, written reflection, and also Socratic Seminar."

To assess her students' understanding of reflective, Wilson assigned practice papers in which the students reflected on some of the questions from a specific unit. She also found that class discussions were an opportunity for students to exhibit reflective thinking. Wilson noted that one question could "turn into like, a 15 minute discussion" because the students would reflect on what others had said and then respond with their own ideas: "They kind of reflect on what their classmates are saying and then kind of, you know, bounce off one another. There's a lot of that."

Wilson believed the benefits of reflective and reflective thinking included a class environment that was less driven by the traditional model of "I ask a question, they give an answer." She also believed that reflection gave students "more time to think," as opposed to a classroom environment in which students answer a question and the teacher moves on: "It makes them really, truly, look back and think about what we've been talking about."

Ms. Kraaft teaches Information Technology in a Global Society (ITGS) in the Diploma Program at Alexander Hamilton High School. She has 24 years of experience as a classroom teacher, seven of those as an IB teacher. Kraaft shared that although she also teaches non-IB classes, she has been "pleased" with her experiences teaching in DP courses:

> My class sizes in the Diploma Programme are smaller. It allows me to get to know my students better. It allows us to have more detailed conversations because we're not interrupted, we're not disrupted. The class is very focused. The kids that are in there absolutely want to be in there, so they're focused on what they have to do.

Kraaft described the training that she received to help her transition into the IB classroom as "phenomenal." She was sent to St. Louis, with IGTS teachers from all across the world for her introduction to the course. She received course materials, syllabi, and teaching suggestions and had the opportunity to work with IGTS teachers who had been teaching the course for several years. Over the years, she's continued to network with teachers she met at that first training ("Like, we're online penpals") and she has attended several regional workshops over the 7 years that she has been teaching the course. Kraaft asserted that The Learner Profile and the ten attributes have been "the primary focus of everything" in the IB trainings she has attended.   The attributes, including reflective, are also discussed in the monthly meetings with the IB coordinator—how to integrate them, how to focus on them in the classroom.

Kraaft defined a reflective student as one who is not only aware of what they're doing at the moment, but, "They can also take a step back from what they're doing and be able to comment on the reasons

why they're doing what they're doing." She discussed a project students in her class completed that involved almost daily reflection on the process, and ended with a report describing their metacognitive strategies as they were building the project. Kraaft concluded, "I don't know an IB student who isn't thinking about their thinking. They're all thinking about their own thinking."

Other strategies that Kraaft implemented to integrate reflection and reflective thinking included a web-based journal, in which students wrote reflections on their daily progress and shared with their peers. Kraaft is able to read the entries as well, to gauge their progress and assess their understanding of reflective thinking. She also evaluates their understanding of reflective thinking through "open discussions" in the classroom. Due to the small number of students, the classroom has a "comfortable, respectful nature" in which all students can share their opinions, questions, and thought processes.

For Kraaft, the benefits of reflective and reflective thinking are that it gives the students a sense of personal accountability for their own learning. Noting that students can almost evaluate their own progress, she added, "A grade is nothing but a number, but they can tell you exactly how they're doing, what they're doing about it, because they're constantly thinking about their own thinking, and they understand where their strengths and their weaknesses are."

Ms. Forrester teaches DP chemistry at Hamilton. At the time of the interview she was completing her fourth year of teaching and had been teaching in an IB program for all four of those years. Forrester explained that teaching in a Diploma Programme, when it was one's "first year teaching ever," was a little difficult at first because it was unfamiliar: "The curriculum was slightly different, the thinking behind it was slightly different . . . . [But] everything made a lot more sense once [I went] through training, and ever since then it's just gotten a lot better."

No training was provided to Forrester before she actually began teaching in the IB program at Hamilton—only a pacing guide for DP that was "really outdated and it didn't really match the curriculum very well." After 5 months, however, she was sent to St. Petersburg, FL, for Diploma training. Forrester expressed that the DP training was very valuable to her, as was the opportunity to meet the presenters and other DP teachers: "I got some of their resources and ideas for IAs [independent assessments] and such, it made it a lot more—I guess it gave me a better reference." Since the original DP training, Forrester has attended a training event for the curriculum update for chemistry.

Forrester shared that she is currently attending George Mason University where she is pursuing a Master's of Education in International Baccalaureate degree. For a recent assignment in her Assessment in IB class, she and her colleagues developed a worksheet that guided students to graph their progress at meeting standards for each of the Learner Profile Attributes.

When asked how she would define or interpret the attribute *reflective*, Forrester responded thus:

> To look at yourself critically and to know what you either know or don't know or what you gained by doing something or what you haven't gained because you didn't put in whatever

amount of work was needed or whether you chose not to. So, just looking at yourself or being self-aware.

Discussing strategies she uses to integrate reflective thinking into her instruction, Forrester explained that lab reports are a "big thing" in chemistry or in any science class. Before her students turn in their lab reports, she requires they complete a self-evaluation of the reports, using rubrics that she provides. Next, a peer evaluates the report, and the report author compares the two evaluations. Finally, Forrester gives the report a score. Before submitting the final draft, students are allowed to make revisions to their individual reports, and hopefully, after completing the process several times, the student will "have a better correlation between, you know, all three of the scores and see, 'I clearly am reflecting on myself and I know what I'm missing, but I just need to do better at not missing that.'"

Forrester expressed that the lab reports exercise also provides an opportunity for her to assess her students' understanding of reflective thinking. For example, she looks to see if the gap between a students' self-assessment and the other two assessments shrinks over time: "If there is a smaller and smaller gap, one, they're being more self-reflective, two, they're probably using the rubrics to be self-reflective in that sense, and check their work before coming to class and having someone else look at it." For a closure activity on the day of a test, Forrest sometimes asks students to write a quick paragraph anticipating what grade they think they made on the test and why they believe they made that grade. "Some of them are actually doing that to the extent that they're saying, 'I know I'm not going to do good and this is why.'"

The final interview question asked for Forrester for her perceptions regarding the benefits of reflective and reflective thinking for her students. Responding to this question, Forrester seemed to focus more on the benefits for teachers than for students, saying, "So instead of you having to sit there and keep telling them to, you know, 'Make sure you do your homework, it's due this day.' If you know that your homework is due then, I don't need to remind you." She concluded, however, "I think that's one of the best things about being reflective, is it helps you understand yourself, which then helps you understand your context of you within other people."

Mr. Otto teaches 11th grade IB Language A, as well as non-IB English, at Alexander Hamilton High School. He has 5 years of experience in K-12 education, with 3 of them teaching the in MYP at Hamilton and 2 of them teaching in the DP. Overall, Otto finds teaching in the DP to be a "rewarding experience," because of the students in the program: "They truly care about their academic success, and so I find it to be meaningful in that, and the kids are endearing and motivating for you as a teacher." Otto believes the IB curriculum is "excellent," and he sometimes uses the IB rubric in a "modified way" with his non-IB classes because they focus so well on what someone should learn in a literature course.

For Otto, learning to teach in an IB program was "kind of a process." Although he had attended a 2-day training for the MYP, for his first two years in the MYP he "struggled" to find meaning in the philosophy because of all the paperwork and because as a new teacher, he was "just trying to keep afloat." As he transitioned in teaching in the DP, he attended a content-specific training that helped somewhat with

the curriculum he would be teaching, but it didn't really have an impact on him until he actually began teaching in the DP:

> I would think back to like, that training, and it would start to fall into place, and as I worked with the kids, I actually saw how the—the methodology of the program is effective in getting kids to be, I guess, initiators in their own learning.

Otto attended some school trainings conducted by his IB coordinator that discussed the Learner Profile when he was teaching in the MYP, although none of them actually focused on reflective. He hasn't attended any training that discussed the Learner Profile since he transitioned to the DP program, because the expectation is that "most people understand the learning profile by now." Otto defines reflective as a process of looking back on what a student has accomplished in the past and assessing how they have progressed as an individual: "Sort of metacognitively identifying what they need to do or what they have done and putting that into words." He felt, however, that most kids don't actually do that—they wait for the teacher to "write a comment" on their paper.

As a strategy to encourage reflective thinking, Otto has his students submit a first draft of a written assignment, and then write a reflective evaluation of their paper, using the rubric, and explain why they gave themselves the scores that they did. When Otto returned their draft papers to them, with his comments, he asked them to compare the two scores and then met with each of them do discuss the discrepancies between the scores. In the past, Otto had concentrated more on having students reflect on their overall growth, but he has focused more in the current year on connecting their reflections to the IB rubric.

According to Otto, the best moment when a teacher can see a student being reflective is when a student has "That *a-ha* moment, where they've been struggling with something for a long time and then they're—they're sitting there, like, 'Wait, I get it. Right?'" The benefits of reflective and reflective thinking, for Otto, is that it can be a tool to tell people what they need to do in order to get to where they want to be. Unless you actually stop and pause and reflect, "You're just sort of wandering and following whatever you've done at the moment without connecting it to any sort of meaning."

Ms. Belle is an English teacher, EE supervisor, and CAS portfolio coordinator for the Diploma Programme at Alexander Hamilton High School. She has 21 years of experience in K-12 education and "about nine" years of experience in the IB DP at Hamilton. Belle described the DP as a "very fascinating approach to learning and to teaching." She was very enthusiastic about the works she was allowed to choose for her English class and the way the district allowed the program to develop, as well IB's emphasis on student driven rather than teacher driven classrooms and focus on global awareness.

Belle had already been teaching AP English literature and composition when she was tapped to teach the IB English courses, and she expressed that the AP training she had received through College Board had helped prepare her for teaching in the DP. After a few months of teaching in the DP, Belle went to Savannah for IB training, and since then she's attended "summer smaller workshops" for English, EE,

and CAS. She and other DP English teachers in the district meet from time to time and try to "use each other as resources, too."

According to Belle, the IB English workshops she attended focused primarily on the course content, but the presenter spent some time discussing the IB mission statement, the Learner Profile, and why it was important to instill the attributes in IB students. One of the CAS workshops that she attended included discussions of the importance of teaching students about reflective writing for CAS. As the current CAS portfolio supervisor, Belle has done some lessons with CAS students in which they discussed the meaning of reflection and how one actually reflects—not just summarize, not just inform—but "internalize the experience and really reflect on what it did to you as a person."

Belle used the analogy of an onion when asked how she defined or interpreted reflective. The first layer is the literal layer of just what happened, but as a person reflects more deeply, they dig past successive layers, examining how an experience has changed them:

> It's part of how we change and develop as a person, by reflecting upon things that have happened to us, books that we've read, people we've encountered, life itself, and along with that to be a better person or a better learner, to reflect on what we're good at. Like, understanding our own strengths and weaknesses.

In Belle's English classes she frequently integrates reflection and reflective thinking via class discussions, either general discussions or the "more formal Socratic Seminar discussions." Sometimes students are asked to come to class with a question to encourage a deeper analysis of a piece of work they may be currently studying. At mid-year, she requires students to examine the IB rubrics and reflect on their confidence in their abilities in regard to upcoming assessments: "Then tell me what you need from me and we can work out a plan, and I can teach classes based on that."

Belle shared that she sometimes finds it difficult to assess students' understanding of reflective because of the abstract nature of the attribute. She uses an analogy to help students understand how to reflect: "What is a reflection? It's a mirror back. It's you." Belle finds that the easiest ways to assess reflection is when she and individual students look at they own writing and discuss how she, as the teacher, can help them clarify their ideas. Sometimes, however, a student will come to class and it's obvious that he or she has reflected on something Belle threw out in a previous class and is "just really excited" to discuss the idea or concept: "I'm like, awesome! If I could just get them to automatically do that every time."

According to Belle, the importance of reflective learning for her DP students or for any students is realizing that learning isn't necessarily something that they are given from the "font of knowledge that [is] the teacher." Instead, it is learning about themselves—their strengths and weaknesses as a learner, a person, and a friend, "in every facet" of their lives.

Mr. Galloway teaches IB Religion in the Diploma Programme at Alexander Hamilton High School. He has 17 years of experience as a teacher, two of which have been in an IB program. He described the experience of teaching in the IB program as "challenging" due to the lack of resources. Galloway expressed that the religion course should offer students a "constructivist type of learning," with access to technology on a daily basis, in order to engage them. The class requires that students "do their own research and presentations and things like that," which was difficult for students to do without computers or other ways to access technology.

Galloway did not receive any IB training prior to making the transition to teaching in the DP. In the two years since, he has had some opportunity for professional learning, although it was not sponsored by IB: "I've worked with people that are—that have a lot more experience in the IB program. I worked with some people last summer in writing curriculum."

Defining reflective as "self-analysis and evaluation of your own work," Galloway explained that he had created a course in the previous year to help students be more successful on the senior exam. He had incorporated ideas of "being reflective and thinking about what you learned and how you did and things that you need to do differently," and his students did reflections on a regular basis in that class. Other reflective strategies that Galloway uses with his students in his IB Religion class include looking for patterns among different religions and examining the ways in which students' new knowledge compares with something they learned in a prior lesson.

One way that Galloway assesses students' understanding of reflective thinking is through reading their journals, looking to see "Some development of them really thinking about what they had done or what they had heard or what they'd experienced, and how it had impacted them, how it had maybe changed them or made them think about something differently." If students write a reflection about a speaker or a presentation, Galloway looks for evidence of students gaining something from the experience or being impacted in some way. In terms of his students exhibiting reflective thinking on their own, however, "I don't really see that too much. . . .For a lot of our kids, it really doesn't come natural."

Ms. Chapman teaches Math Studies SL to 11th and 12th graders at Alexander Hamilton High School. She has 3 years of experience teaching, 1 year in the MYP and 2 years in the DP at Hamilton. Chapman's first year was "kind of a transition year," with only 12 students in the class. Not surprisingly, she has since discovered that when she has fewer students, it's easier to cover the material. Chapman shared that in the current year, she had been trying to "focus on the test." The course covers a lot of different areas, and the students "are sort of all over the place, ability wise," which she believes makes it a more interesting class.

Chapman received no IB training before beginning to teach in the MYP, but when she transitioned to the DP, she completed training for teaching the DP class during the summer before she actually began. Since then Chapman has received training in MYP mathematics and mathematics studies. Hamilton IB teachers "meet pretty much once a month and talk about things," and the IB coordinator offers professional development sometimes, but "I don't think they're mandatory, so I haven't been to any of

them." The MYP mathematics workshop that Chapman attended addressed the Learner Profile "as more of a general thing," including the 10 attributes of an IB learner, but "didn't go into much detail" regarding reflective, specifically.

For Chapman, the word *reflective* is "sort of a self-explanatory title," indicating that students should be "more reflective, in a way, writing about what they're doing and what they know and things like that." She believes a more important facet of reflective thinking, however, is for students to recognize what they don't understand, and Chapman stressed that she tried to focus on that in her DP classes. Before every test or quiz, Chapman's students are required to predict what their grade will be and compare it with their actual score.

Asked about specific strategies that she used to integrate reflection and reflective thinking into her instruction, Chapman shared that whenever she was a doing a problem in class, she had students explain what she was doing to the other students. In addition, whenever a student answers a question in class, she asks the student to explain why that answer is correct. Chapman added, however, that it's difficult to design ways to encourage students to reflect in her mathematics class: "A lot of the math, it requires them to explain their work, but they usually explain it using mathematics, so it's not as—I don't know, it's not as cut and dried as other subjects."

Chapman expressed that her students sometimes exhibited reflective thinking without prompting. For example, when doing a problem in class or going through notes, a student might compare one problem to another or might indicate in other ways that "light bulb" has gone off in their head, but she finds it difficult to encourage it to happen without prompting the students: "I see it happening, but I don't know how to encourage it to happen more, I guess."

In closing, Chapman shared her perceptions of the benefits of reflective and reflective thinking for her DP students and for herself as a teacher.   She noted that reflection provides people with an opportunity to "re-think" about a problem or an issue, concluding, "Reflecting gives you a second chance to look at it and kind of revise things, so I think reflecting is just an important part in any subject."

Chadwick School

Chadwick School is an independent, university preparatory school for girls, established in the early 20th century. Located in a large metropolitan area in south central Canada, the campus contains several heritage structures, as well as modern buildings, and the school's population of approximately 900 students represents countries from around the world. All students follow the IB curriculum, with Grades PreK–6 in the Primary Years Programme, Grades 7–10 in the Middle Years Programme, and Grades 11–12 in the Diploma Programme. Chadwick students strive to graduate with both the IB Diploma and the Secondary School Diploma offered by the province in which the school is located. A team of researchers from the Education Research Center conducted a 2-day site visit to Chadwick School in March 2015.

Classroom observations.

Researchers observed 18 classrooms at Chadwick School across all DP subject groups, including mathematics, sciences, language and literature, language acquisition, individuals and societies, and the arts. The classrooms were of a variety of sizes, and all classrooms observed were equipped with laptop docks for teacher laptops and projectors. Because the school has a 1:1 technology environment, all students had tablet computers, which were used in many of the classrooms observed.

Teacher questioning drove instruction in many of the classrooms visited. Teachers asked targeted questions about specific aspects of content, such as, "Why do people move out of Chinatown?" or "How does diasporic culture impact U.S. culture?" or "What is important about [particular aspect of book]?" Science and mathematics classes tended to be more student-driven than were other content area classes. Students were observed working collaboratively in stations in one science class, while the teacher monitored and clarified student understanding. In mathematics classes, teachers focused on soliciting multiple solutions to problems and students were asked to work with a partner to make conjectures about problems. All classes observed were taught at a high level of rigor, with student conversations and comments showing high levels of reflection with a minimum of teacher prompting. The OFIBP mean scores for the classrooms observed are reported in Table 17. Of the 24 instructional practices observed, Chadwick teacher mean scores were higher than the overall case study site mean scores for 18 of the 24 instructional practices. Shaded rows in Table 17 indicate instructional practices for which teacher mean scores were higher than the overall mean scores for all case study sites. (Highlighted variables do not indicate statistical significance.)

Table 17

Chadwick OFIBP Mean Scores Compared to Overall Case Study Site Mean Scores

Instructional practice	Chadwick mean scores (*n* = 18)		Overall mean scores (*n* = 97)	
	M	SD	*M*	SD
Engaged students	1.94	0.83	1.81	0.87
Explored concepts	2.06	0.75	1.86	0.83
Explained new learning	1.65	0.86	1.83	0.83
Elaborated on new learning	1.35	0.70	1.41	0.64
Evaluated learning	2.65	0.61	2.26	0.78
Connected ideas/concepts	2.41	0.80	2.02	0.84
Initiated experiences/discussions	2.47	0.80	2.24	0.85
Acted as coach/facilitator	2.41	0.80	2.02	0.89
Allowed students to develop concepts	2.35	0.79	2.12	0.85
Provided options for problem solving	1.71	0.99	1.37	0.72
Provided feedback	2.18	0.88	2.31	0.73
Assisted students to organize thinking	2.53	0.62	1.71	0.81
Assisted students to generalize thinking	1.76	0.90	1.54	0.73

Integrated technology in lesson	2.24	0.90	1.79	0.85
Integrated feedback/assessment	2.18	0.88	1.95	0.79
Distributed feedback evenly	2.12	0.93	1.85	0.86
Redirected student thinking	1.59	0.71	1.56	0.70
Began with students' prior knowledge	2.41	0.87	2.07	0.90
Provided opportunities for students to assume responsibility	2.41	0.80	2.05	0.89
Assisted students in applying learning to outside world	1.35	0.79	1.34	0.66
Varied activities according to student preferences	1.24	0.66	1.33	0.69
Varied style of conversation for students	1.00	0.00	1.07	0.33
Provided opportunities for students to learn about global environment	1.53	0.87	1.38	0.72
Provided opportunities for students to develop creativity	1.35	0.79	1.38	0.76

Source. Observation of Features of International Baccalaureate Programs (OFIBP).

Note. Values for observation items are based on a 3-point scale: 1 = *Not observed*, 2 = *Observed to some extent*, 3 = *Observed to a great extent*.

Although teacher questioning was the primary driver of reflective instruction in many of the classrooms observed, Chadwick students' conversations and comments demonstrated reflective thinking with a minimum of teacher prompting. As such, Chadwick's reflective instructional practice mean percent scores, which looked at specific teacher practices targeted at encouraging reflection, were lower than composite mean percent scores in most cases (see Table 18). Although teachers were observed less frequently encouraging specific reflective instructional practices, such as *encouraging students to question their own ideas,* teachers were observed providing students with time to reflect a greater percentage of the time than the composite mean percent score.   For example, students in one arts class were observed reflecting on one another's interpretations of an emotion, while students in science classes were frequently observed asking questions to clarify their understanding without being prompted by the teacher. These findings could indicate that student reflection at Chadwick was driven more by teacher and student questioning than by teacher use of specific instructional practices. Shaded rows in Table 18 indicate reflective instructional practice mean percent scores that were higher than composite mean scores.

Table 18

Chadwick Reflective Instructional Practice Mean Percent Scores Compared to Composite Mean Percent Scores

	Chadwick mean percent scores (*n* = 18)		Composite mean percent scores (*n* = 97)	
Reflective instructional practice	*M*	SD	*M*	SD
Connect content to other disciplines	1.11	3.23	0.31	1.74

Connect content to global communities	7.78	23.65	5.15	19.32
Solicit multiple perspectives on topic	10.00	14.14	11.65	25.77
Encourage students to collaborate	1.67	3.83	3.81	13.88
Encourage students to question their own ideas	2.22	5.48	4.23	9.34
Encourage students to listen to others' ideas	1.11	3.23	3.51	14.07
Encourage students to question others' ideas	0.00	0.00	1.88	12.42
Encourage students to explain their ideas to others	6.11	14.61	8.35	19.46
Provide time for students to reflect	17.22	26.30	10.62	21.50
Encourage extended student responses	4.44	11.99	7.94	17.07
Model thinking for students	3.33	8.40	5.57	12.50
Emphasize intrinsic value of task(s)	1.67	3.83	1.13	5.57
Highlight main/important points	16.11	20.90	18.53	23.21
Connect new material to previously learned material	6.11	10.37	7.84	17.09

Source. Teacher Roles Observation Schedule – IB (TROS-IB).

DP student surveys. A total of 66 DP students were surveyed at Chadwick School. Of the 4 scales on the survey, students had the highest mean scale score on the *understanding* scale (*M* = 13.58), indicating students perceived instruction in their DP courses to be most strongly focused on understanding concepts and content. Similar to the rank order of the composite mean scale scores for reflection and critical reflection, Chadwick students' second and third highest scale scores were on the *reflection* (*M* = 11.94) and *critical reflection* scales (*M* = 11.52). Chadwick students, however, were slightly less likely than the composite sample to perceive their DP courses as requiring them to consider alternative ways of doing things or re-considering previously held beliefs or ideas (see Table 19).

Table 19

Chadwick IB-SRTQ Mean Scale Scores Compared to Composite Mean Scale Scores

	Chadwick mean scale scores (*n* = 66)		Composite mean scale scores (*n* = 205)	
Scale	*M*	SD	*M*	SD
Habitual action	8.42	1.91	8.86	1.88
Understanding	13.58	1.81	13.31	1.69
Reflection	11.94	1.77	12.37	1.89
Critical reflection	11.52	2.36	11.95	2.21

Source. IB Student Reflective Thinking Questionnaire (IB-SRTQ).

Note. Means were calculated using a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree, and 4 = Strongly agree*. A scale score was calculated as a sum of the points for each scale, resulting in a scale score from 0 to 16.

Participant interviews. As part of the site visit to Chadwick School, researchers interviewed 14 administrators and teachers who were involved, to some extent, with the campus IB Diploma Programme. Participants' overall teaching experiences ranged from 6 years to 36 years and experience in any IB program, at any level, ranged from 6 years to 19 years. Interviews were conducted in participants' offices or in meeting rooms throughout the school and lasted about 25 minutes each. Although the questions on the interview protocol established the focus and structure of the interview, participants were encouraged to expand and elaborate on their responses. Interviews were audiotaped for later transcription, and the interviewers took meticulous notes for later examination and consideration.

Mr. Gilmore is an 11th and 12th grade TOK teacher and a CAS coordinator in the Diploma Programme at Chadwick School. He has 6 years of experience as a classroom teacher, all of them at Chadwick. As a student, Gilmore had attended IB schools overseas, and partly because of that, he had focused on IB schools when looking for his first teaching position. As a TOK teacher, Gilmore works "in the core of the DP," and he feels he gets to witness the students "making connections between what's happening in their subject areas classes and how that comes into—you know, how that comes to impact what they're learning in TOK."

Prior to starting in his position at Chadwick, Gilmore attended a TOK workshop, and since then he has completed "a number" of online courses and seminars related to teaching the TOK essay and an online workshop for CAS coordination and attended the IB Conference of the Americas in summer 2014. None of the professional learning opportunities in which he has participated specifically focused on the Learner Profile attributes, "but what I would say is it's so implicit in everything."

When asked how he interprets reflective, Gilmore described it as a process of learning, in which students use their experiences to gain a better understanding of what they are actually learning, what it means to them, and how they make sense of it. Reflection is a "really big part" of his TOK classes: "We're asking students to reflect on their experience as a knower and as a learner, and how—they connect those sort of reflective pieces to kind of some of the—content and concepts that we're teaching in the class." Gilmore integrates reflection into the TOK class through journaling, reflective response writing, and giving students articles to read "with some level of controversy or ethical issues," to have them think about factors pushing them to certain conclusions." He added that reflection is an important part of CAS, as well, and the activities and lessons in both TOK and CAS "are really geared toward some form of reflection." Some students have the idea that reflection is "very airy and light," but in assessing his students' reflections, Gilmore expects to see really clear, concrete connections.

Gilmore teaches 11th and 12th grade TOK, half of the course in each grade, so he has the opportunity to see his students' thinking mature over a 2-year period. He explained that reflective thinking is a skill that's taught, and he sees the students begin to exhibit reflective thinking at the end of their junior year:

I think there's more scaffolding of the skill in Grade 11, for TOK specifically, and you really start to see those sort of—realizations manifest themselves kind of in the later part of the year or when they kind of pick TOK back up after—after the summer in Grade 12.

For Gilmore, the greatest benefit for his students in regard to reflective thinking is that they become aware of their own learning: "One of the biggest things I've seen students benefit from is when they can identify learning gaps and figure out how to fill those gaps." He added that being aware of their learning, however, also includes examining the process when they do well, "to think about, okay, what really worked for me, was it something about this specific exercise that just spoke to me in a certain way that other activities don't, or is it something that, you know, is transferable?" Gilmore, who also teaches in the MYP, asserted in closing that although he had been discussing reflective in relation to his DP classes, reflective was important at Chadwick School for all grade levels: "Our school encourages [reflection] right from the git go, I mean, so I'm talking Grade 11 and 12 specifically, but honestly—we do this in the MYP as well."

Ms. Benvenuto teaches DP chemistry and Theory of Knowledge and is on the extended essay team at Chadwick School. She has been affiliated with K-12 education for "nearly 30 years," and was completing her 11th year in an IB program at the time of the interview. Benvenuto enjoys the "academic rigor" of the DP, together with the "global outlook." Becoming a TOK impacted her chemistry teaching, with the result that her "diploma chemistry courses are very much hands-on, you know, based on hands-on lab work," and she really enjoys the collaboration with the students, in terms of the research process. Benvenuto expressed that it's good for the students to "get to realize what kind of a messy process research can be."

Benvenuto completed her first IB Level 1 and Level 2 training shortly after beginning at Chadwick School. She became an IB examiner, which was "actually a very helpful professional development tool," and completed two workshops to prepare for teaching TOK and one to prepare for extended essay. In addition, Benvenuto leads workshops in IB chemistry, which she believes helps her increase her professional learning. Reflective can manifest itself "in many different ways," according to Benvenuto. She gave an example of a situation where she might give a student formative feedback on a task she had assigned and allow the student to reflect on where s/he is in terms of learning or proficiency before addressing the next steps: "How are they going to follow up on any kind of gaps that they may have identified, and how will they know when they've reached their goals. So I think all of that is part of that reflective process."

Benvenuto described several strategies that she uses to integrate reflective into her instruction. For example, reflection sometimes takes place through peer-to-peer interactions, and in TOK, they sometimes have a group reflection after a presentation: "Doing it in a very safe way, in a way that is honest but that also is, you know, comfortable for everyone in the class." Benvenuto primarily assesses her students' reflective thinking using templates developed by her and her colleagues in the department.

For Benvenuto, any kind of alteration, whether it's in behavior or in an approach, is an indication that students are engaging with and acting on reflective processes: "I think any kind of modification that you see, either in written form or in verbal form or, you know, in terms of their interactions, I think is always a positive step." In concluding the interview, Benvenuto discussed what she sees as the main benefits of reflective thinking for her DP students. She believes reflective thinking helps students become more independent learners, because every student learns differently, and thus, reflective thinking helps the student "develop an almost personalized learning pathway based on what works best them." Finally, reflective thinking helps her students build resilience: "If you are confident in, you know, maybe adapting behaviors, making changes, I think that just allows you to cope with any setbacks. So I think it all ties in with resilience, ultimately."

Mr. Raisor began his career as a classroom teacher in 1988 and has taught in IB programs in Canada and abroad since "1997 or 1998." He currently teaches DP Biology I and DP physics at Chadwick School and taught DP Environment Systems and Societies in the past. Raisor began the interview by sharing that after teaching in IB schools abroad, he specifically looked for a school that included a Diploma Programme when he returned to Canada, because of his high opinion of the DP philosophy and curriculum:

> I had worked hard to—to learn the philosophy, to modify my teaching practice to help students be successful in this program, and I had seen how much of a personal change and how much overall success, including acceptance to universities and university success that students had had through this program.

Raisor attended DP physics training in Bahrain before he began his first IB teaching position. In the years since then he has completed additional DP physics workshops, as well as training in DP biology and in Environmental Systems and Societies. Raisor trained as DP coordinator at the United Nations International School in New York City, as a DP coordinator workshop leader in Geneva, and as a site visitor for the accreditation at the IB Academy, and also trained to be a DP Physics workshop leader. Although none of the training he has attended involved "direct study" of reflection, Raisor has been involved in a pilot project with IB's Approaches to Learning (ATL), in which reflection is a part of the "thinking" skill cluster.

In discussing his interpretation of reflective, Raisor expressed that the attribute "has a lot of different possibilities in the Diploma Programme." He explained, for example, that reflection might occur when a student is looking at her approaches to learning and thinking about how she approaches learning. It can also entail students reflecting on their role in society or in their relationships with each other, such as in "group work and students learning how to work collaboratively with each other in a variety of different ways. . .in different kinds of scenarios." Raisor asserted, moreover, that reflective in the IB includes teachers, "as we try to model the learner attributes and make them alive in the school," and it is also important that the school models those attributes: "So I think there's many layers where reflective plays a role."

As part of the Group 4 project each year, the senior students are required to reflect on the project, on their ability to work within a team, and on their ability to work "sort of outside the normal class process and procedures." Raisor reads his group's reflections and provides feedback on his observations of their performance or their behaviors and whether his observations dovetail with the student's.

> So many girls are very perceptive and you can give them feedback and support that, "Yes, that's what I observed," and then again, there's some girls who—who don't see things exactly the same way, and again, that's a great place to elicit conversations. So that's just another example of where we would be working on different aspects of—of reflection.

When asked to describe strategies that he uses to assess his students' understanding of reflective thinking, Raisor shared a template or action plan that he and other teachers in the department use to help students reflect on content and study approaches after they had completed a test. The template is designed as a framework to guide students' reflections about specific areas of content: "I have them reflect, on a spectrum, how they feel their proficiency lies for that particular concept or content, and they put down some next steps as to what they feel would the—the right thing to do." Raisor believes the action plan accomplishes two outcomes: It helps the students to target their limited amount of time in a very efficient way and it allows for "really effective" conversations to help the students think about other ways they might approach learning. He concluded that the exercise not only assessed students' understanding of reflective thinking, but "sometimes it's an assessment of whether or not their sense of reality, of the level of understanding of concepts and content are on target."

According to Raisor, Chadwick School's advisory program, in which each teacher meets with a group of 10 students every week, provides an opportunity for students to exhibit reflective thinking. Raisor said he often sees students "spontaneously" exhibiting reflective thinking during this period as he listens "to the kind of conversations that they have with each other, and you know, how they approach setback, I suppose—because they often talk very freely." He also sees reflective happening naturally with students in his role as a coach, and he posited that the faculty and staff at Chadwick sometimes take reflection for granted, because "it's happening all of the time. . . .It's a regular practice that happens here."

In closing, Raisor offered a thought-provoking example of why reflective thinking is beneficial to DP students at Chadwick school. He noted that we live in a busy world and Chadwick is a "very busy school." It's "really important" to have time to pause in our busy lives, and reflective thinking offers that opportunity for Chadwick students and teachers:

> Plowing ahead all of the time is not necessarily an effective way to lead your life, and if you don't purposefully hit the pause button and take some time to think about what you've been doing, how you've been doing it, how it makes you feel, and whether or not there are opportunities to change, or reason to change, I think that we can then become really people who just work on automatic pilot.

Ms. Lytle is head of the social studies department at Chadwick school, where she teaches DP history. She has been teaching in the IB program "somewhere around 11 years," and has been a classroom teacher for 16 years overall. Teaching in the DP has been a "really good experience" for Lytle—it was easy for her to make the transition from regular history to IB history because "It really is ground in history and content."

Prior to making the transition to the IB program, Lytle attended Level 1 IB workshop, "where they kind of introduce the entire IB program," and then attended the Level 2 training soon after she began teaching IB history, so she "could get more training around the history course." At the time of the interview she had just returned from Helsinki, where she completed training on the revised history curriculum. Lytle said she "imagined" that the Level 1 training she attended "introduced" the Learner Profile attributes, but "nothing in depth."

Lytle defined reflective as a process in which students are able to "reflect" on their learning and on ways they can improve, as well as be able demonstrate their knowledge of content in a different way. As an example, she noted that very often students will have content knowledge, "but to make that leap from knowing the information to being able to use the information to respond to a question effectively requires some reflection on their part." In order to integrate reflective into her instruction, Lytle has "students do a lot of going over their work," color-coding areas where they effectively shared their knowledge in one color and areas needing improvement in a second color. She has found that before her students can be self-reflective, it is often more effective if they assess someone else's work and then "apply the same method to looking at their own work."

According to Lytle, her assessments of her students' understanding of reflective are "more formative than anything else." She examines the reflection pieces that the students write in order to "make sure they understand what they need to do next," and then meets with them one-on-one to make sure they understand what they can do differently in the future. Lytle said that it is in these one-on-one meetings that she often sees the students exhibiting reflection without being prompted. For example, students often meet with her to receive further feedback on why they received a certain grade on an assignment: "Before the meeting ends. . .they'll usually explain what is it that they need to do next time. So in that sense, I see it as—as sort of reflecting on their learning and on how they can improve."

To Lytle, reflective thinking is beneficial to her students because it allows for growth: "I guess, you know, it's an aspect of being open minded and sort of having a growth mindset as opposed to a closed mindset." She also noted that reflection contributes to her students resilience and perseverance, creating a feedback loop where they receive feedback, reflect on it, and realize how they need to do something different next time: "So they don't see [a low grade] just as a failure, but they see—they see it as a stepping stone in their learning."

Ms. Maguire teaches Environmental Systems and Societies (ESS) in the Diploma Programme at Chadwick School and is also the community service coordinator for the school. She has 17 years of experience as a classroom teacher, 11 of them in the IB program at Chadwick. Maguire was very positive regarding the

ESS course she teaches, describing it as "really integrative" of geography and science and issues in the world today. She said her students are "very keen and passionate" about the course, as well: "It's such a great course! There's just so much energy in the classroom every day. I just go home and constantly talk about how much I love teaching that course."

Maguire began as PYP teacher at Chadwick and received PYP training at a conference in Switzerland, as well as at the school. She also received MYP training internally and received Environmental Systems and Societies Level 1 training before she began teaching the course. At the time of the interview, she had just completed her Level 3 Environmental Systems and Societies training. According to Maguire, there was a "very strong" focus on the Learner Profile attributes in both the PYP and the MYP training, but "less a part of the DP training" she had attended. For example, the attributes were mentioned at the conference she had recently attended, and participants were told to infuse them into the curriculum, but there was no explicit training on how that should look: "There's probably the assumption at a Level 3 conference that there's some understanding of how you might do that."

According to Maguire, reflective can be defined on two levels. "Everyday reflection" involves examining what you're learning, reflecting on who you are as a learner, "and "I think those two pieces take place in class every day." The second level is a "more formalized reflection," where students have completed a summative task or an assessment of learning, and they think through the processes they followed, reflect on gaps in their understanding, and identify ways in which they met the expectations. Students' reflections aren't always accurate, however, or Maguire's reflections on their work may not be accurate, "So it's always a dialogue."

Maguire uses "checklists" that students complete before submitting their lab reports to encourage reflective thinking in the classroom. "They go through and they check off their work to see if they've met the criteria. . . .and then. . .they have a reflective piece after they've looked at my comments, to consolidate their next steps." She also uses peer review, which she believes is "a really important reflective piece." She uses the completed checklists to assess her students' reflective thinking, looking to see if a gap exists between what they actually produced and what they "checked off," and meets with the students to discuss any discrepancies.

According to Maguire, students exhibit reflective thinking in her class "on a regular basis," when they start to connect new learning to prior knowledge: "They can reflect on themselves as learners when we start to talk about strategies or ways of learning, and they can talk about where they've done well and where they're not doing well." She concluded that reflective is "probably the most important attribute" that they try to encourage at Chadwick:

> I think that's the way we move forward as individuals and we grow as individuals, is reflecting on what works and what doesn't work, in terms of study skills and learning skills, but also our own knowledge base and our understanding of that knowledge and how we might exhibit it and express it to others.

Ms. Shadrova is head of the mathematics department and teaches 11th grade math SL at Chadwick. She has had "something like 20" years of experience as a classroom teacher, 9 of which have been in the IB program at Chadwick. Shadrova said teaching in the DP had been a "crash course of learning on the job," learning to understand the difference in the IB approach and grading and anything she had ever taught before. She said, she had "definitely bought in to the approach," however, recognizing the value added of the program for students, as well as making teaching more interesting, helping students move toward unfamiliar problems with confidence. Her biggest challenge as the head and also as a classroom teacher, "is making sure that students that aren't necessarily competent yet in their basic skills can see success and feel encouraged that they're learning something of value."

Shadrova attended her first IB workshop to learn the basics about the program a few days before she started teaching at Chadwick, but since then she's had a variety of Level 1 and Level 2 workshops for MYP and DP mathematics. Chadwick School facilitates summer workshops for IB, and Shadrova has attended some of those as well. Shadrova said she felt that teachers at Chadwick knew "how to address" the Learner Profile attributes, but she couldn't remember attending any workshops that specifically addressed the attributes.

For Shadrova, reflective in the classroom can be defined from the teacher's perspective and from the student's perspective. She explained that as a teacher, she always wants to develop new strategies and ways of addressing the material, but she may not want to discard the old way, or she may want to look at a problem and decide which strategy would be the best to use, but she needs to examine the advantages and disadvantages of each strategy to decide which is most efficient and productive: "There's that kind of—what—what are the tools at our fingertips and how can we reflect on them to find a good strategy, and after actually finding our answer, reflect on that to see if it makes sense." For the students' perspective, a big part of what Shadrova does is to try to get the students to reflect on their progress in learning mathematics. She uses Think/Pair/Share as a strategy to encourage reflective thinking into her classroom, "especially when we're developing a new concept or a new idea, and try to make connections with other math they're supposed to remember." The most important strategy Shadrova uses, however, is the math action plan, which provides a framework for students to use to guide their reflection on content and study approaches: "I want my students to learn from their mistakes or learn from what they've done and keep on learning and building on that, and be involved and take responsibility for that. So, reflective in their own learning." The math action plans are also an effective way for Shadrova to assess her students' understanding of reflective thinking.

Shadrova sees her students frequently exhibit reflective thinking in the classroom when they are doing problem solving in groups. She explained that she can hear the students working together to remind each other of prior learning and she will hear a student say, "'Oh, I remember now.' And it's all that putting together and connecting what they know, what we've been working on, and I just think that's all part of reflecting in mathematics."

When asked about the benefits of reflective and reflective learning for her students, Shadrova shared an incident that had occurred during the after-school daily math clinic that Chadwick sponsored for non-

Chadwick, neighborhood kids. She was trying to help some students with a problem; they knew the formula but since they didn't understand why that formula worked, they couldn't transfer that knowledge to another problem. Chadwick took them "back to the basics of where that had come from, what math they knew could help them develop and lead to that formula," and for the students, it was like a light bulb coming on:

> Math was just something to memorize before, and so this actual understanding—well, I think that's just good teaching, anyway, but that's obviously part of being reflective. How does it all tie in to what I already know? It's not just something—here, memorize this. That doesn't work for math.

Ms. Salter is the deputy principal at Chadwick School. She has 36 years of experience in education, 10 of which occurred in the IB program at Chadwick. Salter was an administrator at Chadwick when the school went through the "tough process" of becoming an IB school:

> It was an exciting time for the school and for its growth, and it was a great strategic move for the school, but it was not an easy process and it took all of us working very collaboratively to make this change in our—in our curriculum.

Prior to becoming an authorized IB school, Salter completed the IB administrator training, as well as "research and exploration in talking to other IB schools." After 10 years, she couldn't remember if any part of the administrator training had focused specifically on the Learner Profile attributes, but Salter did remember the "tremendous sense of connection between the values the school had always upheld and the Learner Profile attributes. It didn't feel as if we were acquiring something new, it felt that we were extending our belief set and clarifying it."

 Salter defines reflective as a "practice of taking time to process and think about all the inputs, all the learnings, and make meaning." She added that in order for reflection to be meaningful, it takes time for individual thinking, time to talk about it with someone else, and "probably," time to write about it:

> I think the allocation of time for reflection is so critical. . . .We build it in not only to the academic program, where it's happening in assessments and assignments and in all kinds of ways in the classroom, but we're very conscious of finding time outside of the classroom to build in reflective time.

According to Salter, one of the most effective strategies that she sees Chadwick teachers implementing to encourage reflective thinking in the classroom is Think/Pair/Share. In this process, students are asked to reflect on a question or a concept individually, then they divide into pairs and discuss their ideas, and finally, each pair shares out with the whole group. Salter had seen it employed in a classroom earlier in the week, as a prelude to a study of *Macbeth*, and every time she sees it in action, she thinks, "How valuable this is as a reflective tool." Although she doesn't have opportunity to see how the teachers

assess their students' understanding of reflective, Salter does see the results when she works on initiatives in the community with the students and witnesses their reflective capabilities:

> Then I think, 'How did the girls get to think that way? How come they're so adept at framing a reflection?' and I realize they're practicing it in the classrooms and then they're bringing that learning into other settings, and it's so good to see.

When asked to describe the benefits of reflective and reflective thinking for Chadwick students, Salter began by explaining that Chadwick School facilitates a service learning initiative that is called Triangle of Hope. Chadwick students work "very closely" with students in a K-8 "after-hours" program that includes Homework Club, math literacy, debate, music, etc., at a high needs, local public school. Part of the initiative also involves a service-learning trip every year to Chadwick's partner school in South Africa, in which Chadwick students do a similar program with the children there. Salter explained that the richness of the experience relates to the reflection Chadwick students write on what it means to be a child in the local high-need public school, what it means to be a student in a low-income school in south Africa, and then "What does this mean about you as a responsible citizen of the world in a situation of privilege?"

Although the girls who have the experience are "changed human beings," Salter asserted that the impact is more than the immediate reflection. She shared that the school had recently sponsored a 10-year reunion of the former students who participated in the first initiative, and the young women shared the long-term impacts of the experience on them: "The reflections on how that experience of working locally and internationally had impacted career choices, skills they had developed, the way they had learned to listen, their understanding of context in education." Positing that the reflective component of the trip was as important as the trip itself, Salter concluded:

> And if it weren't for the fact that IB has this as a construct, we wouldn't be doing this as intentionally. Of course, we would be interested in "How was your trip," but it goes so much further than that. When you pause on the reflective piece of what it means for yourself, but also what it means for your group, what it means for others, what it means for your future, it's the depth to which reflection goes.

Westside High School

Located in a large southeastern state in the US, Westside High School is a 4-year comprehensive high school with a student population of over 2700 students. In addition to an IB Diploma Programme, Westside offers Advanced Placement (AP) and Dual Enrollment courses, an Executive Internship Program that allows students to gain college credit and experience in a professional career, and a Performance Based Diploma Program in which students earn a regular high school diploma at their own pace while also learning occupational skills. Westside is known for its arts programs: Its Chamber Choir has performed in Europe and in New York City's Carnegie Hall, and the marching band has performed in

the Macy's Thanksgiving Day Parade three times. A team of researchers from the Education Research Center conducted a 2-day site visit in April 2015.

Classroom observations. A total of 17 classrooms were observed at Westside High School across all DP subject groups, including mathematics, sciences, language and literature, language acquisition, individuals and societies, and the arts. All classrooms observed were spacious and most were equipped with projectors. Students were mainly seated in individual student desks, with the exception of lab tables in science classrooms.

In many of the classrooms observed, teachers engaged students through questioning and then allowed students to develop concepts on their own. Although teacher questioning was the primary driver of instruction, students frequently asked questions to clarify their understanding of topics addressed. Students most frequently worked independently without technology, although students in some classrooms were observed using laptop computers or cell phones to search for information. In many of the classrooms observed, preparation and review for IB exams was the primary focus of instruction.

The OFIBP instructional practice mean scores for the classrooms observed are reported in Table 20. Shaded rows in Table 20 indicate Westside mean scores that are higher than overall case study site mean scores. (Highlighted variables do not indicate statistical significance.)

Table 20
Westside OFIBP Mean Scores Compared to Overall Case Study Site Mean Scores

Instructional practice	Westside mean scores (*n* = 17)		Overall mean scores (*n* = 97)	
	M	SD	*M*	SD
Engaged students	2.00	0.71	1.81	0.87
Explored concepts	1.76	0.66	1.86	0.83
Explained new learning	1.76	0.44	1.83	0.83
Elaborated on new learning	1.59	0.51	1.41	0.64
Evaluated learning	1.82	0.53	2.26	0.78
Connected ideas/concepts	1.88	0.70	2.02	0.84
Initiated experiences/discussions	2.29	0.77	2.24	0.85
Acted as coach/facilitator	1.82	0.73	2.02	0.89
Allowed students to develop concepts	2.18	0.64	2.12	0.85
Provided options for problem solving	1.71	0.85	1.37	0.72
Provided feedback	2.18	0.39	2.31	0.73
Assisted students to organize thinking	1.24	0.44	1.71	0.81
Assisted students to generalize thinking	1.35	0.49	1.54	0.73
Integrated technology in lesson	1.59	0.62	1.79	0.85
Integrated feedback/assessment	1.76	0.44	1.95	0.79

Distributed feedback evenly	1.82	0.64	1.85	0.86
Redirected student thinking	1.47	0.51	1.56	0.70
Began with students' prior knowledge	1.47	0.72	2.07	0.90
Provided opportunities for students to assume responsibility	1.88	0.70	2.05	0.89
Assisted students in applying learning to outside world	1.24	0.44	1.34	0.66
Varied activities according to student preferences	1.71	0.85	1.33	0.69
Varied style of conversation for students	1.00	0.00	1.07	0.33
Provided opportunities for students to learn about global environment	1.47	0.72	1.38	0.72
Provided opportunities for students to develop creativity	1.24	0.56	1.38	0.76

Source. Observation of Features of International Baccalaureate Programs (OFIBP).

Note. Values for observation items are based on a 3-point scale: 1 = *Not observed*, 2 = *Observed to some extent*, 3 = *Observed to a great extent*.

Westside teachers *highlighted main or important points* about 13% of the time and *solicited multiple perspectives on a topic* about 11% of the time. Most of the reflective instructional practices, however, were not frequently observed. High standard deviations in the data indicate a large degree of variability in the observed practices.

As illustrated in Table 21, reflective instructional practice mean percent scores for Westside were higher than the overall case study site reflective practice mean percent scores for two of the variables observed. Highlighted variables are those for which Westside mean percent scores were higher than the composite mean percent score for all case study sites.

Table 21

Westside Reflective Instructional Practice Mean Percent Scores Compared to Composite Mean Percent Scores

	Westside mean percent scores (*n* = 17)		Composite mean percent scores (*n* = 97)	
Reflective instructional practice	*M*	SD	*M*	SD
Connect content to other disciplines	0.00	0.00	0.31	1.74
Connect content to global communities	0.00	0.00	5.15	19.32
Solicit multiple perspectives on topic	10.59	30.10	11.65	25.77
Encourage students to collaborate	1.18	4.85	3.81	13.88
Encourage students to question their own ideas	4.71	15.05	4.23	9.34

Encourage students to listen to others' ideas	3.53	14.55	3.51	14.07
Encourage students to question others' ideas	0.00	0.00	1.88	12.42
Encourage students to explain their ideas to others	1.18	4.85	8.35	19.46
Provide time for students to reflect	2.35	9.70	10.62	21.50
Encourage extended student responses	3.53	14.55	7.94	17.07
Model thinking for students	0.00	0.00	5.57	12.50
Emphasize intrinsic value of task(s)	0.00	0.00	1.13	5.57
Highlight main/important points	13.35	25.32	18.53	23.21
Connect new material to previously learned material	0.00	0.00	7.84	17.09

Source. Teacher Roles Observation Schedule – IB (TROS-IB).

DP student surveys. Students surveyed at Westside High School, similar to students surveyed at the other case study sites, had the highest mean scale score on the *understanding* scale. This indicates that the students surveyed perceived instruction in their DP courses to be most strongly focused on understanding concepts and content. Westside mean scale scores followed a pattern similar to that of the other case study sites, with the second and third highest scale scores on the *reflection* and *critical reflection* scales, and with the lowest mean score on the *habitual action* scale. Westside student mean scores on the *reflection* and *critical reflection* scales were lower than the composite mean scale scores, while the *habitual action* mean scale score was slightly higher. This indicates that Westside students were slightly less likely than the overall group to perceive that their DP courses required reflection and slightly more likely to perceive their courses as involving repetition (see Table 22).

Table 22

Westside IB-SRTQ Mean Scale Scores Compared to Composite Mean Scale Scores

	Westside (*n* = 44)		Overall (*n* = 205)	
Scale	*M*	SD	*M*	SD
Habitual action	9.93	2.03	8.86	1.88
Understanding	12.79	1.61	13.31	1.69
Reflection	12.16	2.08	12.37	1.89
Critical reflection	11.48	2.13	11.95	2.21

Source. IB Student Reflective Thinking Questionnaire (IB-SRTQ).
Note. Means calculated using a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree, and* 4 = *Strongly agree*. A scale score was calculated as a sum of the points for each scale, resulting in a scale score from 0 to 16.

Participant interviews. As part of the site visit at Westside High School, researchers interviewed 19 administrators and teachers who were involved, to some extent, with the campus IB Diploma Programme. Participants' overall teaching experiences ranged from less than 1 year to 34 years and experience in any IB program, at any level, ranged from less than 1 year to 17 years. Interviews were conducted in a meeting room off the teachers' lounge in the IB wing of the school and lasted about 25

minutes each. Although the questions on the interview protocol established the focus and structure of the interview, participants were encouraged to expand and elaborate on their responses. Interviews were audiotaped for later transcription, and the interviewers took meticulous notes for later examination and consideration.

Ms. Jensen is the IB coordinator at Westside High School. In addition to her coordinator responsibilities, Jensen teaches four sections of 12th grade IB English. She has 17 years of teaching experience, all of which have been gained in the IB program. Jensen described her experience teaching in the DP at Westside High School as "very positive. . .The students, in combination with the type of rigor but flexibility of the IB curriculum has just made it wonderful." For Jensen, IB is a mission-driven program, and part of its attraction for her is that it's a lifestyle as much as it is a profession.

Jensen didn't receive training to help her transition into an IB program because she was hired into an IB school immediately after completing her internship; after a few months, however, she was sent to IB training. Over the next 17 years she attended a variety of professional development opportunities: "Overall, IB workshops are at the top of the food chain." Jensen theorized that IB training is exceptional because of the outstanding materials that participants receive and because of the collegiality and shared experiences of the participants. He had not attended any professional development that focused on the Learner Profile and the attributes of an IB learner, however, primarily because those concepts were typically covered in a Level 1 workshop and he hadn't attended a Level 1 workshop since before the Learner Profile was implement.

For Jensen, empathy is a "huge part" of being a reflective individual: It's not enough for students to be able to reflect on their own experiences, they must also be able to think carefully about others' experiences and their reactions to those experiences.   She explained why empathy is an advantage for students in studying literature:

> Empathy is a huge gift. Kids can bring that [empathy] to the table to really sort of, you know, understand characters, understand their motivations, understand their backgrounds. And I think that is almost a precursor for kids to be really, truly reflective.

Moreover, Jensen noted that reflective was one of the easier attributes for her to incorporate into her curriculum. She employs several strategies to encourage reflective thinking. Her students write reader response journals for all the texts they read. Some of the journal topics are somewhat academic in nature, but many of the topics are ones that Jensen hopes will give her students a "visceral connection with the characters on a very sort of emotional level." A large part of her course is composed of class discussion stemming from their journal topics and from topics in class, which encourages reflection. Jensen assesses her students' understanding of reflective via the daily class discussions of readings from the night before: "They read three or four chapters in a text the night before, and we don't come in and take a quiz on it or watch a PowerPoint, do any of that stuff. . . .It's just, we get into conversation."

For Jensen, it's "amazing" to watch her students develop their capacity for reflection. Students in her class are required to respond to one another during class discussion, as well as to her, and she credits this "culture of shared communication" in her classroom for creating an environment where students are encouraged and supported to "shift midstream. . .as the conversation takes place." She elaborated on how this shift in thinking occurs, using class discussions of *The Awakening* as an example:

> It's a totally transformative experience . . . . They'll come in with very specific opinions, at least in the first half of the text, about the main character . . .. when that moment comes where they have taken over the conversation and to watch them—you know, halfway through the text, this kid despises the main character, but now thorough reflection, through thinking, through conversation, we see that, you know, that thinking shift, change, and that's a good thing. That's growth. . . .You know, part of that reflection piece, too, is the ability to really hear what other people are saying.

Jensen believes the benefit of reflective thinking lies in the way it teaches her students to move outside their "little boxes" and see the complexity of humanity, the ways in which we interrelate and we all struggle together and have common goals and dreams. She concluded, "When you get them to that point, I mean, that's—that's really the art of education, that's the beautiful part of teaching."

Mr. Atkins teaches Mathematics Studies in the Diploma Programme at Westside High School. He has 25 years of experience as a classroom teacher and has been teaching in the IB program since it began at Westview: "I started the first year. I don't know how many years it was." Atkins' philosophy is that teaching in the DP should not be any different than teaching any students: "You teach the students to learn to the best of their ability and to be able to think." He does find, however, that IB students' work ethic is stronger than that of many students not in the program, perhaps because of differences in parental involvement.

Atkins attended IB training in St. Petersburg, FL, prior to transitioning into the DP. In the years since then he has participated in two IB workshops specifically for the Mathematics Studies curriculum, and the IB teachers in the building have "meetings" to talk about any overall changes in the curriculum. "They gave us words to put up around the room" at one of the meetings Atkins had attended in the past, but that was extent of his training on the Learner Profile or the attributes of an IB learner.

Atkins believes the DP students should be reflecting on a regular basis, but unless they're reflecting through TOK, they don't have time. He explained that the DP students have reached a point in their academic careers that they have a checklist of things that they must do in order to graduate, and "It's just check, get it done, get it done, get it done." Atkins wants his students to "reflect mathematically," and in his classes, he questions his students, as a strategy to encourage them to reflect on their thinking processes: "You just said that. Why did you say that? Where did you get it? That kind of thing, to try and get them to think through a problem."

In his classes, Atkins considers the best way to assess his students' reflective thinking lies in the questions his students ask:

> If a child is really thinking about something, their questions are intelligent questions, and sometimes their questions are a step ahead of you because they've thought about that and they'll be going, 'but what if?' kind of thing. So they're actually reflecting on what you're saying, they're thinking about it and they're making a step further, applying what you've just talked about."

Atkins believes his students do "very little" reflective thinking, however, mainly because they're so "stressed" with all the other requirements they have. The seniors, especially, are very focused on orals, and many students work or have other outside activities. Atkins expressed that when students take the time to do it, reflective thinking helps them learn to think for themselves rather than regurgitate what someone else has told them. Often, he sees his students asking, "What answer does [the teacher] want," when they should be reading and reflecting on what they, themselves, actually think: "I think if they had more time to do that kind of reflective thinking, they would actually learn better."

Ms. Harwell teaches Spanish in the Diploma Programme at Westside High School. She has 21 years of teaching experience, 11 of which are with the Westside IB program. Harwell considers herself a "cheerleader" for both for Westside High School and the IB program, to some extent because of the "incredible" students who have completed the DP at Westside: "We have had students that we never imagined would get the diploma come through our doors and somehow managed to not only get the diploma but soar leaps and bounds above others."

Harwell was hired directly into the DP at Westside "about three weeks before school started," so there was no time for her to receive IB training prior to beginning in the program. She did, however, go for Level 1 training about halfway through her first year, and she's attended formal IB training "at least" four times in the years since then. None of the trainings discussed the Learner Profile in depth, but Harwell later developed the curriculum and taught and inquiry skills class for incoming 9th graders, and one of her "very favorite parts" of the class was the Learner Profile and the 10 attributes of an IB learner.

Harwell interprets reflective in "multiple levels." On the most superficial level, it means to "reflect back upon" the positive and negative aspects of an experience. On a deeper level, she considers reflective to mean a process of continually considering one's own actions and words, to be aware of "how we're affecting people around us and how we're affecting ourselves, and people's reactions to us." Overall, reflective means continuing "to make yourself a better person that other people want to be around, that you can have positive impact on everybody, not just students."

According to Harwell, it is sometimes difficult to integrate reflection into instruction when teaching a "basic levels" of a language. She gave an example of one particular strategy, however, that she sometimes uses in teaching verb tenses. Putting a sentence on the board that includes an unfamiliar

verb tense, Harwell has students use context clues to identify the original verb and "back out and do the steps to conjugate the verb." In terms of assessing their understanding of reflective, Harwell uses a questioning strategy to encourage students to reflect on how they reached a particular outcome: "You did really well on this test, but the last few tests you haven't really been able to be successful. So what did you do differently? Well, maybe you need to try that again."

Harwell sees her students exhibiting reflective thinking through the "random comments" they sometimes offer, demonstrating that they're making connections between something they are currently studying and something they learned in the past: "They have that light bulb and they make a connection to something. I feel like it's their own reflection happening." Harwell believes the benefits of reflective and reflective thinking for her students lies in its power to assist one to improve oneself— socially, academically, and pensively. She concluded by stating, "There is no replacement for, 'Well, gee. What worked and what didn't work and how can we make it better next time?'"

Ms. Pace teaches a variety of DP courses at Westside High School, including IB Business Management, information technology in a global society (ITGS), and IB World Language. She has 15 years of experience teaching in the IB program, and 23 years of experience in K-12 teaching overall. Pace's experience in the IB program has been "very positive." Pace was originally a foreign language teacher. Her previous courses emphasized the international aspect of culture, so it was an easy move for her to the IB program.

Pace believes she was "really well prepared" for the transition to the IB program. She attended Level 1 training to prepare for the program, and Westside's IB coordinator at that time held weekly meetings to explore the IB philosophy and mission, which helped as well. Pace has since attended "a lot" of IB professional development, including foreign language trainings, ITGS trainings, and CAS round tables. She also participates in an IB workshop leader-training group.

For Pace, reflective relates to metacognition and "being aware of your own thinking." She expressed that reflection and reflective thinking is "just a normal part of curriculum and instruction." For example, when her students write an essay, the last question is "Reflect on your work. What was the most challenging thing? What did you like best about it? What would you do differently next time?" When Pace presents a lesson to her students, she always concludes by asking questions to encourage student reflection: "I think it's become pretty automatic."

One way that Pace assesses her students' understanding of reflective is through their IB learner journal entries regarding the IB Learner Profile. In their journals, students share their perceptions of themselves in regard to the 10 IB Learner Profile attributes. They share their entries in class and discuss what it means to be a risk taker or to be reflective. Pace sees her students exhibiting reflective thinking during these discussions and other discussions in class, particularly in group discussions where they're working collaboratively: "They say things like, 'Well, I was thinking that is more like this.' And then someone else will say, 'Oh, you know, I never thought of it like that,' and then they kind of go off on a topic."

To Pace, reflection essential for improving oneself and "pondering new ideas." She further believes that reflection is important for all IB students—as well as other students—IB teachers, "and actually, all people," although it's not an easy concept to delineate: "It's an interesting topic. . . [but] reflection is not something that you can really pin down easily."

Mr. Weaver teaches math SL in the Diploma Programme at Westside. At the time of the interview, he was completing his first year in the program and overall, had "about 10 years" of experience in teaching. So far, Weaver "definitely" likes the program. The course he's teaching is a new one at Westside, and "the whole thing's been very interesting, especially kind of starting it from scratch." Weaver attended a 4-day IB training over the summer to prepare for his transition to the DP program: "It covered everything from curriculum content of the exact subject I'm teaching to how to do the IA with students and the exam at the end—everything was included in there. It was invaluable training." The training also included the IB Learner Profile and how the LP relates to Group 5 mathematics. Weaver has not any opportunities for formal IB training during the school year, but he has attended meetings with the IB coordinator and other IB teachers, "which has been helpful."

"Looking at it from a math perspective," Weaver interprets reflective and reflective thinking as a process of having students consider *how* they came to an answer, rather than just putting down a number: "First of all, were they expecting this answer? And then to be able to extend on it as well. So more than just write down the answer and go." One strategy that Weaver employs to encourage reflection in his classroom is to put students in groups of 2-3 and give them time to talk about the problems together: "I definitely make time for that." In addition, many of their homework problems require that they not only provide an answer but explain how they came to that conclusion as well.

Weaver assesses his students' understanding of reflective thinking by "asking them a lot of questions," at each point of the process. He expressed that his students demonstrate reflective thinking when they ask questions that are an extension of the original problem or when they begin thinking about the relationship between the original problem and another topic: "I can tell with the question they ask me that they're reflecting on the answer they just got and how it can relate to other things."

Weaver believes that thinking reflectively "definitely" expands his students' knowledge and prevents them from staying "pigeonholed." He also asserts that reflection helps his students become better at problem solving when they are faced with a new situation, because they have learned to look for connections to prior information or situations.

Mr. Schwab teaches 12th grade Math SL and is a CAS advisor in the Diploma Programme at Westside High School. He has "about" 5 years of experience teaching in the IB program (1 year in the DP) and 11 years of experience teaching overall. So far he has been "impressed" with some of the reflections the DP students did: "I think they needed more, but I don't know—like, being that this is my first year, I know that that's something I'm going to definitely work on because that was something they had difficult with."

Schwab attended a 4-day IB training before began teaching in the IB program: "It was really nice to meet people that have seen it [IB program] from different aspects, and they had so much—there was so much information dispersed in those training sessions." In addition, he has attended two trainings on Internal Assessments. The last training Schwab attended had "briefly" discussed the Learner Profile.

When asked to define the attribute *reflective*, Schwab used the example of looking at data and not only summarizing it, but also discussing limitations, weaknesses, strengths, implications, and uses of the data: "Looking at it from all different aspects, not just one way." Schwab uses questioning to integrate reflective thinking into his instruction: "Ask[ing] how they solved it, why they chose that method, is there another way to look at it, how would you—does your answer make sense?" In addition, he has his students compare and share answers, look at each other's methods of solving a problem, and look at problems that were solved incorrectly and determine why.

Schwab believes his students best exhibit reflective thinking when they ask each other *how* an answer was determined: "Even if they ended up with the same result, they still ask each, 'So you did it this way, but I did it this way, so do you think it works all the time?' And they'll compare strategies." In regard to the benefits of reflective thinking for his students, Schwab asserted that they learn more and have greater retention when they think reflectively, and they learn more about who they are as people and about their own interests. In CAS particularly, the reflective component is powerful: "I think they learn more about an activity and about themselves by reflecting on—reflecting on what they've learned."

Ms. Greely teaches biology in the Diploma Programme at Westside High School. She has 10 years of experience in K-12 teaching, 5 of which have been teaching in the IB program. Greely described her experiences with the IB program thus: "Fantastic! Good kids, challenging content, and IB lays it out really well of what the objectives to be taught are—really no mystery as to what you need to teach the kids. I've loved it so far."

Greely attended one IB workshop prior to transitioning into the program at Westside, which covered "Mostly IB lingo," and was primarily an introduction to IB. The Learner Profile was discussed briefly at this workshop. Other workshops that she's attended since have largely addressed content.

When asked about strategies she uses to integrate reflective and reflective thinking into her instruction, Greely began by explaining that "a lot of crossover" exists between TOK objectives and biology. For example, DP students study in vitro fertilization (IVF) and one of the objectives was to discuss the ethics of IVF.

> [My students] just sat down and had a class discussion on how they feel about IVF and the good things and the bad things about it, and it really made some of them think more deeply about it than just, here's how we—you know, here's what IVF is. . . .not just the science behind it. . .or here's how to do IVF, but here's how it actually affects people.

Greely feels that sometimes it's "tough" to assess students' understanding of reflective thinking.   For example, in a class discussion where students are offering opinions, she can't grade them on opinions. Her solution is to determine if students are looking at the big picture: "Are they looking at society as a whole or are they just looking at the individual or just looking at passing the test? If I can see they are looking at global issues or society issues, then to me, that's reflective. "

Greely's students typically exhibit reflective thinking when they are doing their Internal Assessments. Sometimes a student has to do several different experiments:

> They'll do one and it didn't work out right and they'll have to go back and look through what didn't go right and try to come up with different ways of doing it. . .and then they redesign the whole experiment and try it again. . . .But they most definitely will reflect on the mistakes.

Greely believes that the benefit of reflective thinking for her students is that they "find themselves as a person." If her students can reflect on their mistakes, she believes they can reflect on how their interactions affect others and "It kind of makes them grow as a person."

Mr. Monroe teaches History of the Americas in the Diploma Programme at Westside High School. He has 6 years of experience teaching in the IB program and 12 years of experience teaching overall. Monroe believes his experience teaching in the DP has been "fun and rewarding." He inherited some materials from prior teachers and he's been slowly changing them to make more his materials, and he believes that upcoming changes to the History of Americas exam will help him become "more invested" in the course.

The summer before he began teaching in the DP, and the summer immediately after, Monroe attended IB training workshops where he received a lot of the source material. In the past 5 years he has completed some IB professional development online, focusing on areas such as the Internal Assessment, and he has met with other history teachers across the district. None of the workshops Monroe has attended focused on the Learner Profile or the attributes of an IB Learner, because that information is taught in Level 1 training and he's never attended Level 1 training.

Monroe defines reflective as "looking back at our way of thinking, at the work that we're doing, and reflecting on how we can grow as individuals." His History of Americas 1 class is also AP US History. Students in that class reflect on their past writing and use it to review for both the AP exam and later for the IB exam as well. Since he has the same students for a 2-year cycle, his students can actually go back and review prior papers and "See their growth and reflect on how they've gotten better or in some cases worse. . . .and 'I need to get back to that level to be successful on these exams—on the IB exams.'"

Monroe's classes are "fluid," to allow him to seize "learning moments" when they arise. He said he doesn't use any one particular strategy in his class to assess his students' understanding of reflective: "When I come across something that we can be reflective on, or need to go back and look at. . . we go back and do that, and so it just kind of comes up in the flow." Sometimes Monroe can see in his

students' faces when "the light bulb goes on" and it's obvious that the students are thinking reflectively about a concept. He shared that in the second year of History of the Americas, students are given a specific task. They're allowed to discuss their tasks with each other, and Monroe tries to talk as little as possible:

> I let the students do most of the discussing, and they lead those conversations, and that's where I see it in their faces and I see them all of a sudden writing furiously. . . .So I think it's more where they have the opportunities to discuss. . .with their peers. . . is where we see a lot more of that reflection.

Monroe believes that the benefit of reflective thinking for his students is that they learn to evaluate their own beliefs and judgments. For many students, the preconceived notions that they bring to the History of Americas class are shattered as the students learn to explore primary sources and reflect on their content: "They are the ones who are reflecting and saying, 'I didn't realize this because I didn't read the document.' It makes them learn about bias and it makes them form their own opinions about things."

Zavala High School

Zavala High School is a 3-year high school of approximately 2300 students, located in a large southwestern state in the US. The DP at Zavala began in 2002 with 42 students and has slowly grown to about 90 students. In addition to the IB DP, Zavala offers an Advanced Placement Program, a Gifted and Talented Program, Concurrent Enrollment, Dual Credit, and Career and Technical Education courses to its students, as well as 17 men and women's sports activities, seven fine arts programs, and over 40 clubs and organizations. Foreign languages offered in the curriculum include French, German, Spanish, and American Sign Language (ASL). A team of researchers from the Education Research Center conducted a 2-day site visit in April 2015.

Classroom observations. A total of 8 classrooms were observed at Zavala in four DP subject groups, including sciences, language and literature, individuals and societies, and the arts. This number is smaller than the number of classroom observations conducted at each of the other case study sites, which may have impacted researchers' ability to develop as extensive a case study narrative for Zavala as for other case study sites observed. Moreover, results from the observational instruments used at Zavala should also be treated with caution due to the limited nature of data collection.

Classrooms were mostly spacious and equipped with projectors of some kind. Most classroom seating arrangements observed consisted of individual student desks arranged in rows facing the front of the room.

Instruction at Zavala was predominantly teacher-directed. Teachers were observed to some or a great extent *explaining new learning* and *initiating experiences and discussions*. Students appeared engaged in classroom activities and were prepared to answer questions when asked.

The OFIBP mean scores for the Zavala classrooms observed are reported in Table 23. The OFIBP mean scores for Zavala teachers were higher than the overall case study site OFIBP mean scores for six of the 24 instructional practices, including *engaging students, explaining new learning, elaborating on new learning, assisting students in generalizing thinking, assisting students in applying learning to the outside world*, and *providing opportunities for students to develop creativity.* Highlighted rows in Table 23 indicate Zavala mean scores that are higher than overall case study site mean scores. (Highlighted variables do not indicate statistical significance.)

Table 23

Zavala OFIBP Mean Scores Compared to Overall Case Study Site Mean Scores

Instructional practice	Zavala mean scores (*n* = 8)		Overall mean scores (*n* = 97)	
	M	SD	*M*	SD
Engaged students	2.14	0.90	1.81	0.87
Explored concepts	1.71	0.76	1.86	0.83
Explained new learning	2.14	0.90	1.83	0.83
Elaborated on new learning	1.71	0.49	1.41	0.64
Evaluated learning	1.71	0.49	2.26	0.78
Connected ideas/concepts	1.71	0.49	2.02	0.84
Initiated experiences/discussions	2.14	0.69	2.24	0.85
Acted as coach/facilitator	1.43	0.54	2.02	0.89
Allowed students to develop concepts	1.71	0.49	2.12	0.85
Provided options for problem solving	1.14	0.38	1.37	0.72
Provided feedback	1.71	0.49	2.31	0.73
Assisted students to organize thinking	1.00	0.00	1.71	0.81
Assisted students to generalize thinking	1.57	0.54	1.54	0.73
Integrated technology in lesson	1.29	0.49	1.79	0.85
Integrated feedback/assessment	1.57	0.54	1.95	0.79
Distributed feedback evenly	1.29	0.49	1.85	0.86
Redirected student thinking	1.00	0.00	1.56	0.70
Began with students' prior knowledge	1.14	0.38	2.07	0.90
Provided opportunities for students to assume responsibility	1.86	0.90	2.05	0.89
Assisted students in applying learning to outside world	1.43	0.54	1.34	0.66
Varied activities according to student preferences	1.00	0.00	1.33	0.69

Varied style of conversation for students	1.00	0.00	1.07	0.33
Provided opportunities for students to learn about global environment	1.43	0.54	1.38	0.72
Provided opportunities for students to develop creativity	1.00	0.00	1.38	0.76

Source. Observation of Features of International Baccalaureate Programs (OFIBP).

Note. Values for observation items based on a 3-point scale with 1 = Not observed, 2 = Observed to some extent, and 3 = Observed to a great extent.

Of the 14 reflective instructional practices, four were observed at Zavala. Although reflective instructional practices were not observed to a great extent, possibly due to the limited data collection at this school, most teachers were observed in at least one data collection interval *encouraging students to collaborate*, *providing time for students to reflect*, *encouraging extended student responses*, and *highlighting main points of a lesso*n (see Table 24).

Table 24

Zavala Reflective Instructional Practice Mean Percent Scores Compared to Composite Mean Percent Scores

	Zavala mean percent scores (*n* = 8)		Composite mean Percent scores (*n* = 97)	
Reflective instructional practice	*M*	SD	*M*	SD
Connect content to other disciplines	0.00	0.00	0.31	1.74
Connect content to global communities	0.00	0.00	5.15	19.32
Solicit multiple perspectives on topic	0.00	0.00	11.65	25.77
Encourage students to collaborate	5.00	14.14	3.81	13.88
Encourage students to question their own ideas	0.00	0.00	4.23	9.34
Encourage students to listen to others' ideas	0.00	0.00	3.51	14.07
Encourage students to question others' ideas	0.00	0.00	1.88	12.42
Encourage students to explain their ideas to others	0.00	0.00	8.35	19.46
Provide time for students to reflect	7.50	21.21	10.62	21.50
Encourage extended student responses	2.50	7.07	7.94	17.07
Model thinking for students	0.00	0.00	5.57	12.50
Emphasize intrinsic value of task(s)	0.00	0.00	1.13	5.57
Highlight main/important points	2.50	7.07	18.53	23.21
Connect new material to previously learned material	0.00	0.00	7.84	17.09

Source. Teacher Roles Observation Schedule – IB (TROS-IB).

DP student surveys. A total of 28 students were surveyed at Zavala High School.   In contrast to the composite mean scale scores, Zavala identified most strongly with statements on the scale measuring reflection. This indicates that Zavala students were more likely than students in the overall sample to perceive that their DP courses required them to reflect on their actions to improve or question the way other students do something in order to find a better way to do it. Zavala students had almost equal mean scores on the *understanding* and *critical reflection* scales, indicating students perceived their DP classes were about equally focused on understanding concepts and on challenging students' personal beliefs or notions about what they might have previously believed to be true (see Table 25).

Table 25

Zavala IB-SRTQ Mean Scale Scores Compared to Composite Mean Scale Scores

Scale	Zavala mean scale scores (*n* = 28)		Composite mean scale scores (*n* = 205)	
	M	SD	*M*	SD
Habitual action	9.69	1.62	8.86	1.88
Understanding	12.58	1.96	13.31	1.69
Reflection	12.73	2.09	12.37	1.89
Critical reflection	12.54	2.18	11.95	2.21

Source. IB Student Reflective Thinking Questionnaire (IB-SRTQ).

Note. Mean scores calculated using a 4-point scale, with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree, and* 4 = *Strongly agree*. A scale score was calculated as a sum of the points for each scale, resulting in a scale score from 0 to 16.

Participant Interviews

As part of the site visit at Zavala High School, researchers interviewed 4 administrators and teachers who were involved, to some extent, with the campus IB Diploma Programme. Participants' overall teaching experiences ranged from less than 9 years to 36 years and experience in any IB program, at any level, ranged from "approximately 4 years" to 13 years. Interviews were conducted in a meeting room connected to the main office in the school and lasted about 25 minutes each. Although the questions on the interview protocol established the focus and structure of the interview, participants were encouraged to expand and elaborate on their responses. Interviews were audiotaped for later transcription, and the interviewers took meticulous notes for later examination and consideration.

Mr. Cassell is the IB coordinator for Zavala High School. He has 36 years of experience in K-12 education, 13 of them in positions affiliated with the IB program. Cassell's favorite part of the DP is "the impact it's had on students' lives and the things that it's changed." Zavala is a "fairly diverse" school, with "lots of different kinds of students," and Cassell is proud that the program and the school have been able to help students achieve their dreams of successfully attending college.

Cassell had been the CAS coordinator prior to becoming the IB coordinator, although he never taught in the program. He attended CAS coordinator training in Canada, which helped introduce him to the IB philosophy. In the years since, Cassell has attended extended essay training and IB coordinator training and has been able to attend the annual conference "almost every year." In addition, he meets twice yearly with other IB coordinators from his area of the state, and Zavala has hosted summer workshops for IB teachers. Cassell noted that the Learner Profile is a part of "everything IB does," and it had been specifically targeted at one of the summer workshops at Zavala.

To Cassell, "reflective" is a word used frequently in the IB program, not just when talking about an IB activity. He defined reflective as attempting "to get [students] to think about what they're doing and to—to learn from what they've done and to kind of figure out what—what these things mean." Cassell

explained that adults understand that if you keep doing the same thing, you're going to get the same results: "So trying to help [students] learn to change is good."

When asked for examples of ways the DP teachers at Zavala integrate reflective thinking into their instruction, Cassell explained that Zavala's district is a Continuous Improvement District, and "as we look at that Plan, Do, Study, Act, we're always thinking about how can we improve, what can we do, what can we learn from what we've got." In the classroom, Zavala DP teachers extend that focus on reflective thinking by "just ask[ing] them to think about things. I think that—just the simple part of just asking them." He sees Zavala students, on the other hand, often exhibit reflective thinking when they don't even realize he's listening to their conversations: "I think if you sit and you listen to them, you know. . . .I think you hear them thinking about things and asking questions and trying their very best to figure out what it means."

Cassell concluded by explaining he believes learning to be a reflective thinker could give Zavala students the skills to "be the group that really figures things out." The news is depressing, adults often don't seem to have the answers, but these students could be the ones "to change the world."

Ms. Siegert teaches biology in the Diploma Programme at Zavala High School. She has 9 years of experience as a classroom teacher, 4 of them in the DP. Siegert said she enjoyed teaching in the IB program: "The way the course was designed, it's an investigation by nature, and I enjoy the prep work because it's setting up for class discussion almost, you know, three or four days a week."

Prior to her transition to teaching in the DP, Siegert attended a 3-day IB workshop in St. Petersburg, FL. One day of the workshop was devoted to general IB training, but the other 2 days were "Biology specific. . . .How did biology fit into the entire program and then what were the specific details of biology to make you a successful biology teacher in the IB program." Since then she has attended the summer IB workshops at Zavala where DP teachers from around the state have a "meeting of minds, share information, changes in the curriculum, success, failures, what to do, what not to do." Siegert shared that during the previous summer she had attended a statewide workshop that was supposed to address the new biology curriculum, but, instead, "They . . .spent two days discussing the Learner Profile and TOK. . . .guiding teachers on how to produce reflective thinkers."

In her classroom, Siegert uses "questioning strategies" to integrate reflective thinking into her teaching. For example, sometimes she will "call out" a rhetorical question and tell her students that she wants them to think about it and process it for a few minutes:

> I have my desks set up in groups, and so, after a minute or so, or longer, just depending on the level of the question, they'll turn and they'll share—they'll start a discussion with the people at their table. And then I'll ask the students to reflect on somebody else's comments from that discussion versus their own. And how has that—how are their comments influenced, what they thought they knew going into that discussion.

Siegert believes that "really getting the students to write" is one of the best strategies for assessing students' understanding of reflective thinking, although it's very demanding in terms of teacher time for grading. It's worth the time investment for her as a teacher, however, to train the students to use the rubric in their writing: "Here's the expectations from my—on the teacher's part of what I want in your reflective thinking and writing, and then, you know, have it—make it routine as part of the class." According to Siegert, she usually sees her students exhibit reflective thinking when she returns graded tests or quizzes and the students discuss how they prepared for it, whether or not their strategies worked, and what strategies they have successfully utilized in the past. In addition, she sometimes sees her senior students making connections between the senior and junior curricula or connections between one unit and another: "I would consider that reflective thinking."

Siegert identified two benefits of reflective and reflective thinking for her students. First, reflective thinking helps them understand that "their actions have consequences," both positive and negative. In addition, reflective thinking helps them understand their connections to their community and their world: "It's where they fit, how they fit in the society and that they're not just on a solo mission through this life."

Ms. Ashford teaches History of the Americas and 20th Century Topics in the Diploma Programme at Zavala. She has 13 years of experience in the DP and 15 years of experience overall as a classroom teacher. Ashford had retired from a previous position in a totally different field when she was recruited to teach IB history at Zavala, and she enthusiastically asserted: "I love it. I love it. I love the students. I love the challenge. I like the content. There is nothing here about this program that I don't like!"

Ashford attended IB training "maybe one week" before beginning as an IB teacher. She has attended other IB workshops over the last 13 years, both local and out of state, but noted, "The ones that have helped me the most are the ones that IB puts on. . . . I think overall, what IB does for us is pretty good." According to Ashford, the Learner Profile and the attributes of an IB learner were built in to many workshops she has attended: "In fact, the last one I attended, they—they spent at least an hour on that."

For Ashford, the best way to integrate reflective thinking into her teaching is through group discussion: "And the smaller, you know, the group, the better." She likes to have the desks in her classroom set up in groups of four—three for the students and one for her to sit in on the discussions: "And you know, if I'm in this particular group, 'What do you think about this? What do you think about this? And to what extent do you agree with this observation?'" In assessing her students' understanding of reflection, Ashford tries to stress that their opinions must be supported by "some basic facts of history."

Ashford shared that she always has "a lot of stuff" written on the board, to stimulate conversation when her students enter the classroom. Sometimes it's a very successful strategy, "if they're interested, if they're in that mood." Listening to the discussions among the students, however, is one of the ways she sees her students exhibiting reflective thinking.

According to Ashford, the ability to be reflective is "huge" when her students graduate and go to college. She asserted that some of her good students could already "easily step into a college level Junior history class and be successful," because they know how to reflect, they understand the issues, and they recognize that other people may think differently than they do, and "I think the reflective thinking is an integral part of that. She concluded proudly: "I think these kids as a whole, after two years here in the IB program, you see them, you can see—you see them grow. You can't say that about all high school students."

Ms. Scott teaches higher-level language arts in the Diploma Programme at Zavala. She has been a classroom teacher for "I believe it's 23 years," 13 years of which have been in the DP. Scott said she has "enjoyed" her experiences in the IB program. She described the program as one that "encourages the teacher to continue learning in the process with the kids." Scott feels that she essentially reinvents the course each year, so "It's a challenge, but it's a good challenge."

Scott transitioned into the Zavala DP from an AP program in a different district. She was sent to IB training in Montezuma, NM, where she spent a week "just engrossed with the entire IB program. . . .It was wonderful!" Zavala has always encouraged its IB teachers to collaborate with IB teachers in other schools and other districts, providing them with professional time to "go and observe classes, to ask questions, to bring your curriculum with you, and also, there's a tremendous amount of sharing back and forth if you have questions." In return, Zavala teachers have offered the same support to new IB teachers and new IB programs in and out of the district. When asked about any professional development she had received that specifically addressed the Learner Profile and the attributes of an IB learner, however, Scott explained that most of the IB professional development she had received had been focused "on the fact that it needs to be student centered and that the students should always be put into a situation where they are left with the accessibility to question and intercommunicate."

In what she called her "own jargon," Scott defined reflection as follows: "Reflection means that I have experience with something and I draw back on the experience and see what value has come from it." One strategy that she uses to integrate reflective thinking into her teaching is "learning how to ask questions that have a greater depth." In addition, because the IB philosophy encourages the teacher to facilitate discussions in which there is "no technical right answer" her students they must be reflective thinkers in order "to get those upper level scores." She elaborated thus:

> There's no way you can train someone to look for deeper meaning, but you can acquaint them with the process of being able to have and experience with the literature instead of seeing it as something that you read and then you answer questions and then you're done. . . .And if you're a reflective thinker, you're never done—you're never finished as a learner.

Scott assesses her students' development as reflective thinkers primarily through the internal assessment that they all complete. She expressed that a student must be truly reflective to be able to reach past a textbook analysis during the IA and move on to the really insightful points that could not have been memorized from the book or a lecture in a classroom: "It's very invigorating and from a

teacher standpoint, it's very fulfilling." According to Scott, one of the best ways to witness DP students exhibiting reflective thinking at Zavala is to go into the IB office during lunch period: "It's a treasure to behold, when it's happening!" IB students at Zavala are encouraged to form study groups—but not study groups "where we all sit around and eat popcorn and talk." Instead, Zavala study groups are where:

> You legitimately learn to teach each other and ask each other questions. . . .And when you see them, when they're preparing for their IAs and when they're preparing for the assessment, for the actual papers in the spring, they have learned to sit together at lunch with a hamburger in one hand and papers in the other to ask each other significant questions about History of the Americas. . . .It's a delight.

Scott believes that one of the benefits of reflective thinking for her students is that they develop "a certain confidence in their own learning." Former students often "come back from university" to visit her, but they don't talk about how easy the coursework is but "how much they're enjoying it." Scott concluded by sharing that the school has had a "tremendous shift" in the demographics of its student population and the DP is reaching a more "diverse population." It's always gratifying for her, as a teacher, when students return from college to share how well they're doing, but "to see them come out of this program when they are the first child or the first generation to go to college and they come back with success stories, it doesn't get any better than that."

Research Question 7: What interpretations, policies, and practices characterize successful models of integrating reflective thinking, and what suggestions can be made that would facilitate the integration of reflective thinking into policy and practice at IB DP schools?

A multiple case study includes two stages of analysis: the within-case analysis and the cross-case analysis (Merriam, 2009, p. 204). Although the particular features of each individual case may include unique contextual factors, the researcher attempts to delineate and illustrate the facets and themes common to all the cases (Merriam; Yin, 2008). A cross-case analysis of data collected during the individual site visits in the current study was conducted to determine if there were perceptions, interpretations, policies, and practices that characterized Diploma Programmes that were successful at integrating reflective thinking into their instruction. The results of the cross-case analysis are discussed in this section.

Observational data. Quantitative cross-case analyses of the observational data primarily utilized MANOVAs to determine if statistically significant ($p < .05$) differences exist between the six case study sites on each set of variables on both the TROS-IB and the OFIBP. In cases where MANOVAs revealed statistically significant differences between sites, Dunnett's C post hoc tests were used to determine the specific sites between which differences existed. In addition, observation data were analyzed using descriptive statistics. Although field notes from classroom observations were not formally analyzed (e.g., content analysis), they provided contextual support for observation findings. Researchers

observed a total of 97 classrooms during case study site visits. The number of observations at each site was approximately equal for five of the six site visits, with a smaller number at one site. Table 26 displays the number and percent of observations by site.

Table 26

Number of Classroom Observations by Case Study Site

Site	N	%
New Haven High School	19	19.6
Spring Creek High School	17	17.5
Chadwick School	18	18.6
Westside High School	17	17.5
Alexander Hamilton High School	18	18.6
Zavala High School	8	8.2
Total	97	100.0

Source. IB-Reflective Classroom Observation Data.

Classroom observations were conducted in each of the IB subject groups, with a relatively equal distribution in most subject groups, although both sciences classrooms and individuals and societies classrooms were slightly over-represented (23.7% and 20.6% respectively) in the sample. Of the classrooms observed, approximately 16% were in mathematics and about 24% were in sciences, while language and literature and language acquisition comprised almost 25% of the classrooms observed. About one-fifth (20.6%) of the observations took place in individuals and societies courses (i.e., history, psychology, and philosophy), while a little over 12% (12.4%) of the observations were in classrooms studying the arts (i.e., dance, theater, and visual arts). Theory of Knowledge was the main instructional focus in three of the classrooms visited (3.1%). Table 27 shows the number and percent of observations by IB subject group.

Table 27

Number of Classroom Observations by Subject Group

Subject group	N	%
Mathematics	15	15.5
Sciences	23	23.7
Language and literature	13	13.4
Language acquisition	11	11.3
Individuals and societies	20	20.6
The arts	12	12.4
Theory of Knowledge	3	3.1
Total	97	100.0

Source. IB-Reflective Classroom Observation Data.

The TROS–IB was used to examine (a) teacher interactions with students, (b) use of various instructional settings, (c) reflective instructional practices, and (d) nature of teacher-student interaction in the DP

classrooms visited. Each teacher in the present study was observed for six to ten 30-second intervals during each data collection period. Following the observation, researchers calculated the frequency with which each variable was observed by dividing the number of intervals in which a variable was observed by the total number of time intervals in the data collection period. One-way MANOVAs were conducted by the total number of observations at each case study site on each of the four sections of the TROS–IB to determine if statistically significant differences existed in various aspects of the DP learning environment by case study site.

A one-way MANOVA was conducted by case study site on the observed types of teacher/student interaction. The results of the MANOVA revealed no significant difference between case study sites (*Pillai's trace* = .373 *F*(5, 91) = 1.21, p = .210). Table 28 reports mean scores and standard deviations for each teacher/student interaction variable by case study site. *Instructional interactions* were observed most frequently between DP teachers and students, with a range of 62.50% to 85.88%. High standard deviations in the data indicate a wide variability in the instructional interactions observed. Non-instructional types of interaction, including *managerial interaction* (i.e., providing non-instructional information and/or taking attendance) and *social/personal interaction* (i.e., laughing or joking with students about non-instructional topics) were observed least frequently.

Table 28

Teacher/Student Interactions: Mean Percentages by Case Study Site

Type of interaction	New Haven (*n* = 19)		Spring Creek (*n* = 17)		Chadwick (*n* = 18)		Westside (*n* = 17)		Hamilton (*n* = 18)		Zavala (*n* = 8)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
No interaction	10.53	31.53	1.18	4.85	3.89	6.98	7.06	14.04	2.78	4.61	27.50	20.01
Instructional	72.11	40.36	70.58	32.11	80.00	24.97	85.88	22.10	69.44	36.86	62.50	44.64
Managerial	10.00	23.33	8.24	12.37	8.33	23.58	5.88	16.98	6.11	13.35	5.00	14.14
Social/personal	0.00	0.00	2.35	5.62	0.00	0.00	1.18	4.85	0.00	0.00	0.00	0.00
Collaborative	1.05	3.15	4.71	15.05	3.89	9.79	0.00	0.00	12.78	27.40	5.00	14.14
Other	4.74	18.37	5.88	24.25	0.00	0.00	0.00	0.00	5.00	14.65	0.00	0.00

Source. Teacher Roles Observation Schedule–IB (TROS–IB).

Pillai's trace = .373 *F*(5, 91) = 1.21, p = .210.

A one-way MANOVA was conducted by case study site on the observed types of instructional settings. The results of the MANOVA revealed no significant difference between case study sites (*Pillai's trace* = .341 *F*(5, 91) = 1.33, p = .133). Table 29 reports mean scores and standard deviations for each type of observed instructional setting by case study site. *Whole group* instructional settings were most commonly observed, with a range of 52.70% to 72.50%. *Small group* settings were observed much less frequently at most sites and almost never (Westside) or not at all (Zavala). (It should be noted that the number of observations at Zavala [*n* = 8] was less than half the number of observations at other case study sites.) Students were also infrequently working as *individuals*, although more often than working with a *small group* of students. Teachers were only observed *traveling* (i.e., moving between groups) at two schools. High standard deviations in the data indicate a wide variability in the instructional settings observed.

Table 29

Instructional Settings: Mean Percentages by Case Study Site

Instructional setting	New Haven (*n* = 19)		Spring Creek (*n* = 17)		Chadwick (*n* = 18)		Westside (*n* = 17)		Hamilton (*n* = 18)		Zavala (*n* = 8)	
	M	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD
Whole class	67.37	47.12	65.88	36.07	52.78	43.50	63.53	45.41	65.56	39.44	72.50	41.32
Small group	18.42	36.71	15.88	31.83	27.78	37.97	2.35	9.70	15.00	29.36	0.00	0.00
Individual	13.68	32.53	11.76	22.14	15.56	26.84	10.59	23.58	25.00	37.14	15.00	35.05
Traveling	0.00	0.00	0.00	0.00	0.00	0.00	18.82	37.06	0.00	0.00	5.00	14.14
Other	4.21	13.05	2.94	12.13	0.00	0.00	4.71	19.40	3.33	14.14	0.00	0.00

Source. Teacher Roles Observation Schedule–IB (TROS–IB).

Pillai's trace = .341 *F*(5, 91) = 1.33, p = .133.

A one-way MANOVA was conducted by case study site on the observed types of reflective instructional practices. The results of the MANOVA revealed significant differences between case study sites (*Pillai's trace* = .972 *F*(5, 90) = 1.40, p = .03) for three reflective instructional practices: *encouraging extended student responses, modeling thinking for students,* and *connecting new material to previously learned material.* Although the MANOVA revealed significant differences for three reflective practices, Dunnett's C post hoc results only revealed a significant difference between groups for *connecting new material to previously learned material.* Teachers at New Haven *connected new material to previously learned material or concepts* statistically significantly more often than teachers at Westside or Zavala. Teachers at Westside and Zavala were not observed engaged in this reflective instructional practice. Reflective instructional practice mean percent scores are reported for reflective instructional practices in Table 30. Similar to results for other observed variables, high standard deviations in the data indicate a wide variability in the reflective instructional practices observed.

Table 30

Reflective Instructional Practices: Mean Percentages by Case Study Site

Reflective instructional practice	New Haven (n = 19)		Spring Creek (n = 17)		Chadwick (n = 18)		Westside (n = 17)		Hamilton (n = 18)		Zavala (n = 8)		
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	F
Connect content to other disciplines	0.56	2.36	0.00	0.00	1.11	3.23	0.00	0.00	0.00	0.00	0.00	0.00	1.22
Connect content to global communities	7.22	18.73	5.88	24.25	7.78	23.65	0.00	0.00	7.22	24.21	0.00	0.00	0.49
Solicit multiple perspectives on topic	21.11	36.44	10.59	28.17	10.00	14.14	10.59	30.10	8.89	19.06	0.00	0.00	0.88
Encourage students to collaborate	8.33	23.58	3.53	10.57	1.67	3.83	1.18	4.85	3.89	16.50	5.00	14.14	0.59
Encourage students to question their own ideas	7.78	8.78	4.12	8.70	2.22	5.48	4.71	15.05	3.89	8.50	0.00	0.00	1.02
Encourage students to listen to others' ideas	8.33	24.08	1.76	3.93	1.11	3.23	3.53	14.55	3.89	16.50	0.00	0.00	0.66
Encourage students to question others' ideas	5.56	23.57	0.00	0.00	0.00	0.00	0.00	0.00	4.44	16.53	0.00	0.00	0.73
Encourage students to	12.22	23.40	12.94	21.43	6.11	14.61	1.18	4.85	9.44	23.88	0.00	0.00	1.27

explain their ideas to others													
Provide time for students to reflect	12.22	17.68	8.82	22.61	17.22	26.30	2.35	9.70	10.00	22.75	7.50	21.21	0.98
Encourage extended student responses	18.89	23.74	1.76	3.93	4.44	11.99	3.53	14.55	9.44	16.26	2.50	7.07	3.16*
Model thinking for students	12.78	17.42	8.24	16.67	3.33	8.40	0.00	0.00	4.44	9.84	0.00	0.00	2.80*
Emphasize intrinsic value of task(s)	3.89	11.95	0.00	0.00	1.67	3.83	0.00	0.00	0.56	2.36	0.00	0.00	1.31
Highlight main/ important points	26.11	29.73	25.29	22.11	16.11	20.90	13.35	25.32	18.89	19.37	2.50	7.07	1.69
Connect new material to previously learned material	19.44^a	25.78	12.35^{ab}	23.59	6.11^{ab}	10.37	0.00^b	0.00	3.33^{ab}	6.86	0.00^b	0.00	3.72**

Source. Teacher Roles Observation Schedule–IB (TROS–IB).

Pillai's trace = .972 F(5, 90) = 1.40, p = .03. **p<.01 *p<.05. Means sharing the superscript letters are not significantly different from one another (Dunnett's C post hoc, p < .05).

A one-way MANOVA was conducted by case study site on the observed nature of teacher and student interactions. The results of the MANOVA revealed a significant difference between case study sites (*Pillai's trace* = .763 *F*(5, 90) = 1.96, p = .001). Dunnett's C post hoc results are reported for teacher /student interactions in Table 31. Though the MANOVA revealed significant differences for four types of teacher/student interactions, Dunnett's C post hoc results only revealed a significant difference between groups for *cueing and prompting.* Teachers at New Haven were observed *cueing or prompting* students statistically significantly more often were teachers at Spring Creek or Chadwick. High standard deviations in the data indicate a wide variability in the observed nature of teacher and student interactions.

Table 31

Teacher/Student Interactions: Mean Percentages by Case Study Site

Type of interaction	New Haven (*n* = 19)		Spring Creek (*n* = 17)		Chadwick (*n* = 18)		Westside (*n* = 17)		Hamilton (*n* = 18)		Zavala (*n* = 8)		
	M	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*F*
Questioning (process)	10.53	19.29	18.82	20.88	11.67	16.54	11.25	19.28	13.88	18.83	2.50	7.07	0.96
Questioning (content)	25.26	26.53	12.35	14.80	27.78	25.79	43.93	42.27	22.78	22.44	37.50	36.15	2.38*
Explaining	33.68	27.53	42.94	22.29	55.56	25.72	66.25	37.75	37.78	23.40	50.00	40.00	3.01*
General Commenting	1.58	5.01	8.24	12.86	1.11	3.23	1.25	5.00	0.56	2.36	17.50	36.15	3.28**
Listening/ observing	18.94	25.14	23.53	28.93	22.78	21.37	18.75	36.12	31.11	26.32	25.00	38.17	0.44
Cueing/ prompting	31.05^a	26.22	9.41^b	12.49	9.44^b	10.56	15.00^{ab}	20.00	11.67^{ab}	11.50	7.50^{ab}	14.88	4.49**
Modeling/ demonstrating	18.95	24.70	24.71	31.25	11.11	16.41	24.19	29.13	13.33	21.69	5.00	14.14	1.33
Other	10.00	18.56	0.59	2.43	3.33	11.88	2.50	10.00	2.22	9.43	0.00	0.00	1.68

Source. Teacher Roles Observation Schedule–IB (TROS–IB).

Pillai's trace = .763 *F*(5, 90) = 1.96, p = .001. **p<.01, *p<.05. Means sharing the superscript letters are not significantly different from one another (Dunnett's C post hoc, p < .05).

The OFIBP was used to examine the extent to which (a) teachers' general instructional practices and (b) student behaviors and activities were observed in the IB classrooms. The OFIBP measures the extent to which certain effective instructional strategies are demonstrated during a class period on a 3-point scale (1 = *Not observed*, 2 =*observed to some extent*, and 3 = *Observed to a great extent*). In addition to the systematic observation instruments, researchers recorded field notes throughout each observation. One-way MANOVAs were conducted by case study site on each section of the *OFIBP* to determine if statistically significant differences existed in various aspects of the overall DP learning environments by case study site.

A one-way MANOVA was conducted by case study site on the extent to which certain types of instructional practices were observed. The results of the MANOVA revealed a significant difference between case study sites (*Pillai's trace* = 2.113 F(5, 77) = 2.13, p =.001). Dunnett's C post hoc results are reported for overall instructional variables in Table 32. Statistically significant differences were observed in 10 of the 24 variables. The post hoc tests revealed group differences for four of the 10 variables. Teachers observed at New Haven and Spring Creek *provided feedback* to students statistically significantly more often than teachers at Westside, Hamilton, and Zavala*.* In addition, Chadwick teachers were observed *assisting students to organize their thinking* to some or to a great extent statistically significantly more often than teachers observed at Westside, Hamilton, or Zavala. In addition, New Haven and Spring Creek teachers were also observed *assisting students in their thinking* statistically significantly more often than teachers at Zavala.

With regard to instructional feedback, teachers at New Haven, Chadwick, and Westside were statistically significantly more likely than teachers at Zavala to *redirect student thinking* to some or to a great extent. In addition, teachers observed at Spring Creek and Chadwick were observed *beginning with students' prior knowledge* statistically significantly more often than teachers at Westside and Zavala. As with most of the other observed variables, high standard deviations in the data indicate a wide variability in the observed nature of teacher and student interactions. Table 32 reports the mean scores and standard deviations of the observed overall instructional practices.

Table 32

Overall Instructional Practices: Mean Scores by Case Study Site

Instructional practice	New Haven (*n* = 19)		Spring Creek (*n* = 17)		Chadwick (*n* = 18)		Westside (*n* = 17)		Hamilton (*n* = 18)		Zavala (*n* = 8)		
	M	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*M*	SD	*F*
Engaged students	2.16	0.96	1.41	0.80	1.94	0.83	2.00	0.71	1.39	0.78	2.14	0.90	2.89*
Explored concepts	2.11	0.88	1.94	0.97	2.06	0.75	1.76	0.66	1.50	0.86	1.71	0.76	1.34
Explained new learning	2.05	0.85	2.12	0.99	1.65	0.86	1.76	0.44	1.44	0.78	2.14	0.90	1.92
Elaborated on new learning	1.58	0.90	1.24	0.44	1.35	0.70	1.59	0.51	1.17	0.51	1.71	0.49	1.68
Evaluated learning	2.42	0.84	2.29	0.85	2.65	0.61	1.82	0.53	2.33	0.84	1.71	0.49	3.15*
Connected ideas/concepts	1.95	0.91	2.41	0.87	2.41	0.80	1.88	0.70	1.61	0.78	1.71	0.49	2.92*
Initiated experiences/ Discussions	2.32	0.82	2.24	0.97	2.47	0.80	2.29	0.77	1.94	0.94	2.14	0.69	0.74
Acted as coach/facilitator	2.16	0.96	2.00	1.00	2.41	0.80	1.82	0.73	1.94	0.94	1.43	0.54	1.62
Allowed students to develop concepts	2.00	1.00	1.94	0.97	2.35	0.79	2.18	0.64	2.28	0.90	1.71	0.49	0.94
Provided options for problem solving	1.26	0.56	1.18	0.53	1.71	0.99	1.71	0.85	1.11	0.47	1.14	0.38	2.66*
Provided feedback	2.63^a	0.68	2.76^a	0.56	2.18^{ab}	0.88	2.18^b	0.39	2.00^b	0.77	1.71^b	0.49	4.60**
Assisted students to organize thinking	1.95^{ab}	0.85	1.88^{ab}	0.78	2.53^a	0.62	1.24^{bc}	0.44	1.22^{bc}	0.55	1.00^{ac}	0.00	11.81**
Assisted students to generalize thinking	1.74	0.87	1.41	0.71	1.76	0.90	1.35	0.49	1.39	0.61	1.57	0.54	1.10**
Integrated technology in lesson	1.53	0.77	1.76	0.90	2.24	0.90	1.59	0.62	2.06	0.94	1.29	0.49	2.53
Integrated feedback/assessment	2.42	0.77	1.94	0.90	2.18	0.88	1.76	0.44	1.56	0.71	1.57	0.54	3.42
Distributed feedback evenly	2.00	0.94	1.65	0.93	2.12	0.93	1.82	0.64	1.89	0.90	1.29	0.49	1.26**
Redirected student thinking	1.95^a	0.78	1.47^{ab}	0.62	1.59^a	0.71	1.47^a	0.51	1.50^{ab}	0.79	1.00^b	0.00	2.40
Began with students' prior knowledge	1.95^{ab}	0.78	2.59^a	0.80	2.41^a	0.87	1.47^{bc}	0.72	2.33^{ab}	0.91	1.14^c	0.38	6.39*

	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	F
Provided opportunities for students to assume responsibility	2.00	0.94	2.18	0.95	2.41	0.80	1.88	0.70	1.89	1.02	1.86	0.90	0.94**
Assisted students in applying learning to outside world	1.42	0.77	1.24	0.56	1.35	0.79	1.24	0.44	1.39	0.78	1.43	0.54	0.26
Varied activities according to student preferences	1.42	0.77	1.18	0.53	1.24	0.66	1.71	0.85	1.22	0.65	1.00	0.00	1.78
Varied style of conversation for students	1.32	0.67	1.06	0.24	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	2.83*
Provided opportunities for students to learn about global environment	1.42	0.84	1.18	0.53	1.53	0.87	1.47	0.72	1.28	0.67	1.43	0.54	0.55
Provided opportunities for students to develop creativity	1.74	0.99	1.18	0.53	1.35	0.79	1.24	0.56	1.50	0.86	1.00	0.00	1.71

Source. Observation of Features of International Baccalaureate Programs (OFIBP).

Note. Values for observation items are based on a 3-point scale with 1 = *Not observed*, 2 = *Observed to some extent*, and 3 = *Observed to a great extent*.

Pillai's trace = 2.113 $F_{(5, 77)}$ = 2.13, p = .001. **$p<.01$, *$p< .05$. Means sharing the superscript letters are not significantly different from one another (Dunnett's C post hoc, $p < .05$).

A one-way MANOVA was conducted by case study site on the extent to which certain types of student behaviors and activities were observed (see Table 33). The results of the MANOVA revealed a significant difference between case study sites (*Pillai's trace* = .865 *F*(5, 89) = 1.98, p = .001). Statistically significant differences were observed in three of the nine variables. Dunnett's C post hoc tests revealed group differences for only one of the variables. Students observed at Chadwick were observed *using technology to for problem solving/creativity* to some or to a great extent statistically significantly more than students at Zavala, who were not observed using technology for problem solving or creative purpose at all. Table 33 reports the means and standard deviations for observed student behaviors and activities.

Table 33

Overall Student Behaviors and Activities: Mean Scores by Case Study Site

Instructional practice	New Haven (n = 19)		Spring Creek (n = 17)		Chadwick (n = 18)		Westside (n = 17)		Hamilton (n = 18)		Zavala (n = 8)		
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	F
Initiated/assumed responsibility for activities	2.05	0.97	2.29	0.92	2.41	0.80	1.82	0.73	2.17	0.92	1.86	0.90	1.06
Connected ideas and concepts	1.95	0.91	2.18	0.95	2.18	0.81	1.71	0.47	2.17	0.92	1.71	0.49	1.09
Demonstrated meta-cognitive strategies	1.89	0.94	2.00	1.00	1.88	0.86	1.24	0.44	1.67	0.91	1.14	0.38	2.51*
Utilized alternative ways to answer	1.37	0.68	1.59	0.94	1.47	0.87	1.12	0.33	1.11	0.47	1.00	0.00	1.69
Participated in problem solving	1.21	0.63	1.59	0.94	1.47	0.87	1.71	0.85	1.11	0.47	1.14	0.38	1.76
Used technology for problem solving/creativity	1.21[ab]	0.63	1.12[ab]	0.49	1.94[a]	1.03	1.53[ab]	0.80	1.22[ab]	0.65	1.00[b]	0.00	3.50**
Used technology to learn basic skills	1.11	0.46	1.24	0.66	1.59	0.94	1.18	0.53	1.11	0.47	1.00	0.00	1.69
Engaged in classroom activities	2.89[b]	0.46	2.24[a]	0.97	2.94[b]	0.24	2.82[ab]	0.39	2.72[ab]	0.67	2.57[ab]	0.54	3.24*
Activities were learner-centered	2.26	0.87	1.88	0.99	2.35	0.79	2.29	0.59	2.06	0.94	2.14	0.69	0.75

Source. Observation of Features of International Baccalaureate Programs (OFIBP).

Note. Values for observation items based on a 3-point scale with 1 = *Not observed*, 2 = *Observed to some extent*, and 3 = *Observed to a great extent*.

Pillai's trace = .865 F(5, 89) = 1.98, p = .001. **p < .01, *p < .05. Means sharing the superscript letters are not significantly different from one another (Dunnett's C post hoc, p < .05).

DP Student Survey Data

The IB–SRTQ contained 16 items targeting students' perceptions of their actions and practices related to reflection in DP courses. The survey was adapted from the Reflective Thinking Questionnaire (RTQ) developed by Kember et al. (2000). The survey has been found to be a reliable and valid measure of undergraduate student perceptions of their reflective thinking. Because most of the DP students surveyed were 18 or over, researchers felt that the RTQ could reliably measure DP student perceptions of their individual reflective thinking actions.

The survey, based primarily on the work of Mezirow (1991), utilizes 4 sub-scales of reflective thinking, which include habitual action, understanding, reflection, and critical reflection. The first scale, *habitual action*, includes rote activities one can complete by memory, such as tying one's shoe. Habitual action is considered to be the lowest level and does not require reflection at all. A second scale, *understanding*, is based on Bloom's (1979) interpretation of the word, in which one understands something without relating it to other situations. The third scale, *reflection*, is based on Dewey's (1933) definition of reflection as "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends" (p. 9). The final scale, *critical reflection*, is considered a higher form of reflection, in which one begins to consider why one thinks as one does, as well as changing beliefs as a result of an experience.

The DP students aged 18 and over at each case study site were administered a paper and pencil version of the IB–SRTQ during the site visit. After all student questions regarding the research study and the survey were answered, students who chose to take the survey gave their assent and completed the survey anonymously. Administrators at one case study site opted to obtain parent consent for students younger than 18, in order for them to take the survey as well. The students were asked the extent to which they agreed with survey statements, using a 4-point scale, with 1 = S*trongly disagree*, 2 = *Disagree*, 3 = *Agree, and 4 = Strongly agree*.

The 4-point scale utilized in the IB–SRTQ was a modification from Kember et al.'s (2000) version of the RTQ, which utilized a 5-point scale. An additional modification was the insertion of "DP" into survey items referring to "courses" or "coursework" (i.e., DP courses) to help insure that respondents were considering only their experiences with reflection in their DP courses, to the greatest extent possible, when completing the survey.

Overall Student Survey Results

In order to analyze the survey data, we utilized the original four scales from the RTQ: *habitual action* (HA), *understanding* (U), *reflection* (R), and *critical reflection* (CR). Internal consistency reliability of the scales was calculated using Cronbach's alpha. The reliability and inter-scale correlations of the four scales are shown in Table 34. The alpha reliabilities of the scales, although moderate, are comparable with alphas for the scales established in previous research (Kember et al., 2000; Leung & Kember, 2003). In addition, similar to findings in previous studies (Kember et al.; Leung & Kember), inter-scale

correlations in the present study indicate some overlap between the scales. *Habitual action* (HA) and the other 3 scales show slight (-.007) to statistically significant (-.331**, $p < .01$ negative correlations, indicating that students who strongly identify with the habitual action construct may not strongly identify with forms of reflective thinking. There were also statistically significant ($p < .01$) inter-scale correlations between understanding and both types of reflection, as well as between the two types of reflection.

Table 34

Alpha Reliability and Inter-scale Correlations for IB Student Reflective Thinking Questionnaire Scales

| Scale | Alpha reliability | Inter-scale Correlations | | | |
		HA	U	R	CR
Habitual action	.62	1	-.331**	-.007	-.068
Understanding	.59		1	.219**	.225**
Reflection	.69			1	.328**
Critical reflection	.70				1

Source. IB Student Reflective Thinking Questionnaire (IB-SRTQ).

Note. HA = habitual action; U = understanding; R = reflection; CR = critical reflection. **p < .01.

Quantitative cross-case analyses of the observational data primarily utilized Multivariate Analysis of Variance (MANOVA) to determine if statistically significant ($p < .05$) differences existed between the six case study sites on each of the four IB-SRTQ scales. In addition, survey data were analyzed using descriptive statistics. A total 205 students completed the survey during case study site visits. Due to student scheduling conflicts, varied sizes of school DP population, and the fact that one school elected to survey all DP students—including those under the age of 18—one site is underrepresented in the sample ($n = 13$), while another is overrepresented ($n = 66$). Table 35 displays number and percent of student survey respondents by site.

Table 35

Number of IB Student Reflective Thinking Questionnaire Respondents by Case Study Site

Site	n	%
New Haven High School	24	11.7
Spring Creek High School	30	14.6
Chadwick School	66	32.2
Westside High School	44	21.5
Alexander Hamilton High School	13	6.3
Zavala High School	28	13.7
Total	205	100.0

Source. IB Student Reflective Thinking Questionnaire (IB–SRTQ).

A one-way MANOVA was conducted by case study site on the four scales to determine if statistically significant differences existed in case study site students' perceptions of their actions and practices

related to reflective thinking in DP courses. Student scores for each scale were computed by summing a student's level of agreement for the 4 items addressing each of the four scales (1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree*, 4 = *Strongly disagree*), resulting in a possible score for each scale ranging from 0 to 16 (Kember, 2000). The results of the overall MANOVA revealed a significant difference between case study sites (*Wilks' lambda* = .677 *F*(5, 192) = 3.92, p = .001). Tukey post hoc tests revealed group differences in three of the 4 scales (*habitual action*, *reflection*, and *critical reflection*). The post hoc results are reported in Table 36.

Habitual action scale scores for Westside High School (*M* = 9.95) were statistically significantly higher than *habitual action* scale scores for students at Chadwick School (*M* = 8.45), Alexander Hamilton High School (*M* = 8.10), and New Haven High School (*M* = 7.96). These findings indicated that Westside students were more likely than students at other campuses to perceive their DP courses as involving repetition and not requiring much thought. Survey items included statements such as, "When I am working on some DP course activities, I can do them without thinking about what I am doing," and, "In my DP courses, we do things so many times that I sometimes do them without thinking." Although there were statistically significant differences between sites on the *habitual action* scale, overall mean scores were lower than those on any other scale, ranging from 7.96 – 9.95. This indicates that DP students at all sites identified less strongly with *habitual action* than with the other 3 scales.

Although the MANOVA revealed a statistically significant difference in case study sites for students' scores on the *understanding* scale, Tukey post hoc tests did not show any specific differences between sites. Mean scale scores for the items measuring students' perceptions of reflective in DP courses as a form of understanding ranged from 12.58 – 13.88, with an overall mean score of 13.31. The overall mean score on this scale was the highest of any of the four scales, indicating that DP students surveyed felt most strongly that DP courses required an understanding of concepts and course content. Survey items included statements such as, "Our DP courses require us to understand concepts taught by the teachers," and, "To pass a DP course, you need to understand the content of the course."

Tukey post hoc tests revealed significant differences between case study sites on items measuring reflection. As illustrated in Table 36, students at New Haven scored statistically significantly higher on the *reflection* scale (*M* = 13.70) than did students at Chadwick (*M* = 11.92), Hamilton (*M* = 11.87), and Westside (*M* = 12.15).   The scale included items such as, "I sometimes question the way others do something and try to think of a better way," and, "I like to think over what I have been doing and consider alternative ways of doing it." In addition, Hamilton students scored statistically significantly higher on the *critical reflection* scale (*M* = 13.23) than did students at Chadwick (*M* = 11.48), with the mean critical reflection scores of the other sites falling somewhere in between. The *critical reflection* scale included items regarding changes in students or in their beliefs as a result of DP activities, such as, "As a result of my DP courses, I have changed the way I look at myself," and, "During my DP coursework, I have discovered faults in what I previously believed to be right." The mean scores on the *critical reflection* scale, ranging from 11.48 to 13.23 were lower than mean scores for the *understanding* scales at each site, but higher than the means for the *habitual action* scale.

Table 36

IB–SRTQ Mean Scale Scores by Case Study Site

Scale	New Haven (n = 26)		Spring Creek (n = 30)		Chadwick (n = 66)		Westside (n = 44)		Hamilton (n = 13)		Zavala (n = 28)		
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	F
Habitual action	7.96[a]	0.36	8.10[a]	0.32	8.45[ab]	0.22	9.95[c]	0.27	9.31[abc]	0.48	9.69[bc]	0.34	7.71**
Understanding	13.88	0.33	13.67	0.30	13.55	0.21	12.81	0.26	13.31	0.45	12.58	0.32	2.95*
Reflection	13.70[b]	0.37	11.87[a]	0.33	11.92[a]	0.22	12.15[a]	0.28	13.15[ab]	0.50	12.73[ab]	0.35	4.82**
Critical reflection	12.08[ab]	0.44	12.37[ab]	0.39	11.48[a]	0.27	11.59[ab]	0.34	13.23[b]	0.60	12.54[ab]	0.42	2.40*

Source. IB Student Reflective Thinking Questionnaire (IB–SRTQ).

Wilks' lambda = .677 *F*(5, 192) = 3.92, p = .001. **$p < .01$ *$p < .05$.

Note. Student scale scores are a sum of responses to 4 items on a 4-point scale with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Agree,* and 4 = *Strongly agree.*

Means sharing the superscript letters are not significantly different from one another (Tukey post hoc, *p* < .05).

The IB-SRTQ findings are in line with those from previous research (Kember et al., 2000; Leung & Keber, 2003), in which students surveyed (*n* = 303) identified most strongly with understanding and reflection scales and least strongly with critical reflection and habitual action scales. Kember et al. (2000) hypothesized that scale scores for critical reflection items in the aforementioned study were lower because critical reflection requires, "a significant change of perspective" (p. 385), which is brought about only by identifying assumptions—often hidden—one has about an issue and basically redefining both one's assumptions and one's perspective (p. 391). In addition, the rigor of the undergraduate courses of the students surveyed in Kember's RTQ validation study (2000), dictated that habitual actions, such as memorization and repetitive activities, were not a primary means of instruction for the students surveyed. Given the DP's focus on preparing its students for successful post-secondary education, it is not surprising that the student survey results regarding habitual action, in the current study, closely mirror those of Kember et al.

Overall DP Teacher and Administrator Interview Results

Qualitative data collected during semi-structured interviews at the case study sites were examined across cases to determine common themes related to participants' definitions/interpretations of reflective, instructional strategies to encourage reflection in the DP students and to assess students' understanding of reflective, and the benefits of reflective and reflective thinking for DP students in the case study schools. In this section we discuss the themes that emerged from the analysis of the interview data.

Defining Reflective

We identified three prevalent themes across the case study sites related to defining reflective: (a) Reflection as a tool for academic growth, (b) Reflection as a tool for personal growth, and (c) Reflection as tool for metacognition.

Reflective thinking as a tool for academic growth. Reflective thinking was identified as a tool for academic growth to a great extent at all sites we visited, but to some extent, it was the theme discussed in the most superficial terms, using reflection as a synonym for learning. For example, one teacher expressed, "It means that they take the time to digest what they're taught and then how they use that and how they bring it back, either in the form of their coursework or the stuff that they submit to me." Other participants seemed to define the word literally, as one would use a mirror to reflect past academic success or lack of success, in order to avoid future academic missteps. "Definitely just looking at things that you've done in the past and—and preparing for future work and making sure that—that you're continuing on a path to success," one teacher mused, and a second agreed: "To me, reflective means learning from the past. You know, going back and looking at your mistakes, going back and trying to see what you learned from that, trying to avoid the mistakes." Others saw reflective as a way to identify and bridge learning gaps: "How they are going to follow up on, you know, any kind of gaps that they may have identified," or "Reflection [is] where, when they've done a summative task or an assessment of learning, they reflect very formally on where the gaps were in their understanding, both

before they might hand in a big piece of work, and after." Finally, one participant asserted, "To be reflective, the students need to be able to examine past experiences and relate them—relate them to how they can be used in the future."

Reflective thinking as a tool for personal growth. Participants at most sites considered reflective to be a tool for personal growth. "Looking back at our way of thinking. . .and reflecting on how we can grow as individuals," was the definition offered by one respondent, and a second expounded thus:

> There's the digging deeper and reflecting upon what has that done or how has that affected me as a person, what has that changed or added to me as a person, like, a deeper reflection. . . .It's part of how we change and develop as a person, by reflecting upon things that have happened to us, books that we've read, people we've encountered, life itself."

Some participants expressed that when discussing certain issues in class, students were encouraged to contemplate how an issue "affects people's lives and . . . affects society as a whole," or to consider how their "words and actions" affected others. One respondent concluded, "To be reflective is to just continue to make yourself a better person that other people want to be around, so you can have a positive impact on everybody."

Acknowledging that a part of his responsibilities as a DP teacher was to encourage reflection in his students, a final participant defined reflective thus:

> To think deliberately about how to act and think in responsible ways in—in regard to other people . . . Bottom line, I think, in the reflective thing is to—is to develop thinking and thoughtful people . . . primarily in regard to how one's own thinking and attitude and actions and decision making affects other people.

Reflective thinking as a tool for metacognition. Reflective as a tool for metacognition was the final theme we identified in relation to defining reflective thinking, although it was not a theme evidenced at every site. For example, one participant expressed, "The attribute [reflective] goes beyond that to really kind of think, you know, of metacognition, think of myself as a thinker, as a learner." Participants at several sites discussed the importance of teaching students to reflect on one's own learning. A science teacher at one site explained:

> In the IB Diploma Programme, reflection can mean that a student is looking at their approaches to learning, for example, and thinking about how they approach learning. . . .So I think it can be students reflecting on their own learning.

A participant at another site concurred: "I think you reflect on how you learn as a learner and how you can learn better. That's what I mostly get out of reflective learning," and a second agreed: "In the IB Diploma Programme, reflection can mean that a student is looking at their approaches to learning, for example, and thinking about how they approach learning." Explaining that reflection as a component of

metacognition had been "really a vague concept" at one time, before teachers were taught how to include it in their curricula and their lesson plans, another participant teacher explained that reflection had become a more common practice among many of her students: "[Reflection] relates to metacognition, to being aware of your thinking, and I think students, in the last decade, are a lot more capable of understanding that than they were when I first started teaching." A final participant compared reflection to finding an inner space in which to consider one's learning:

> It has very much to do with metacognition and the capacity to almost, in a sense, create an internal space. . . .I feel very strongly that the students who do this well. . .are students who are willing to step back from their own actions, their thoughts, their behaviors, and they create that inner space of awareness.

Integrating Reflective into Instruction

We identified four prevalent themes across the case study sites related to strategies for integrating reflective into instruction: (a) collaborative learning, (b) class discussion, (c) critical writing, and (d) self-evaluation. We also found that many participants utilized a hybrid approach; for instance, sometimes combining self-evaluation with critical writing or collaborative learning with class discussion.

Collaborative learning. We observed that participants used a variety of strategies to encourage collaborative learning in all case study sites. Some strategies were as simple as "peer to peer reflections" or Think/Pair/Share, wherein students individually considered a question or issue; next separated into pairs and shared their ideas with a peer; and finally, each pair shared out the results of their discussion with the class as a whole. In one participant's class, "The students sit in groups of two or three . . .and they are given time to talk about the problems together. I think that really encourages reflective thinking, too. So I definitely make time for that." Other participants identified more complex strategies, such as what one interview participant described as forcing students "to workshop with other students as to the strengths and weaknesses of their material." He elaborated on the process thus:

> Generally they have to compare the similarities and differences—advantages and disadvantages—of their work in comparison to a group of other students. They'll get into a group. . .and they'll just simply either Venn diagram, double bubble, or T-chart similarities and differences. . .and they'll actually share out the work that they had completed on their own and then they will compare it in that fashion with other students. Ultimately the idea is, you know, five heads are better than one.

Class discussion. Participants across all sites identified class discussion as a valuable tool for integrating reflective thinking into their teaching, or as one participant expressed: "I'm huge into open discussions." Sometimes the discussions were organized as "more formal Socratic Seminar discussions," while in other classes, it was described as "just general discussions." One participant, who opined that small group discussions were more fruitful than large group discussions, explained his methods like this:

I'd say the easiest answer for that is group discussions. And the smaller the group, the better. I especially like to have four desks in an area. Three desks for students and one's empty for me to come around and sit with them as we, you know, as they're going through the various discussions.

One participant, who taught French, however, confessed that facilitating class discussions was sometimes difficult in a foreign language: "Sometimes our discussions don't really go very well or go very deep. . . .but I try to ask hard questions or questions that require them to be reflective, even if they're not capable of expressing all the detail back to me in French."

Critical writing. Participants in all subject areas and across all the case study sites discussed writing as a technique to encourage reflection in their classes. A history teacher, for example, asserted, "Writing is very reflective, and even if it's not reflective on a personal standpoint, it's certainly reflective in a historical standpoint." A Spanish teacher shared that in her classroom, students kept logbooks, and "after every test has been made up, every test has been graded, they actually sit down and write a few sentences about. . .what they did, what they could do to improve, how they feel about it."

Many participants shared that they used journal writing as a specific writing technique to foster reflective thinking. "We do reader response journals. . . .Some of the prompts are more sort of academic, but a lot have to do with topics that I hope will build some—some sense of emotional resonance with the kids," said one teacher, and another shared, "We do journals. . .but I don't do journals where you've read it and now you summarize. [Instead], 'So and so performed this action. Was that justified or was it not?'" A dance teacher, who expressed that it was "painful" for anyone to watch their own performances, not only required her students to watch videos of their own individual performances but also to write about them in their dance journals:

> We keep a dance journal, and in it they—they do a lot of things. One, any time we do a performance, I make them watch their performance. . . .They have to reflect on—on their performance, and usually I'll give them a specific thing to look at, or I'll take the IB rubric and say, "Okay, you know the criteria here, I want you to look at this piece, and you know, how would you evaluate yourself?"

Self-evaluation. Many participants reported that they used a form of "self evaluation" to integrate reflection into their instruction. Self-evaluation, in this case, took different forms. For one biology teacher, lab reports were a vehicle for a multi-step process in which students evaluated their own work:

> So before they turn in their lab reports, I usually have them do their self-evaluation of them. So they get their own rubrics, and instead of me grading it for them, they'll grade it themselves, keep that score to themselves, give it to their neighbor, they'll grade that, compare the two, and then I'll give them my score after all that's done. But in between the phases, they can go back and change it.

A second participant, who had discovered that students who evaluated other students' work first were more accurate in evaluating their own work, shared, "Often I find that. . .it's a little bit easier for them to do it helping someone else, so I'll have them do that first, as well, and then apply the same method to looking at their own work." A second participant agreed with this approach: "There's reflection that happens when they analyze someone else's work. . . when they actually have to evaluate someone else's work and think more deeply about what those criteria mean." And an English teacher reported how she used self-evaluation to encourage students to reflect on written assignments:

> When they turned in their first draft, I had them write a reflective evaluation of themselves. So I had them grade themselves on the rubric, and—more important than the numerical scores—I had them write out why they think they got this, and justify. . .what they thought about their paper.

Other participants described using templates, rubrics, checklists, and action plans to provide a framework to help students evaluate their own work, "to reflect on content but also to reflect on their approaches to study."

Assessing Students' Understanding of Reflective

We identified three prevalent themes across the case study sites related to strategies for assessing students' understanding of reflective: (a) increased learning, (b) accurate self-assessment, (c) evidence of critical thinking.

Increased learning. Many participants identified increased learning as a feature of reflection, assessing their students' understanding of reflective by examining the extent to which students' reflective thinking resulted in academic or social maturation. A social studies teacher defined his expectations as follows:

> The main thing is going to be the extent to which they learn from it, which is to say that when they reflect on something and they notice certain strengths and weaknesses, do the strengths continue, do the weaknesses get better, do we show development over time as a result of that reflection, and that's really the most important thing. . . .The idea is to see progress, and to see progress specific to what their weaknesses are.

An English teacher, on the other hand, examined students' writing for evidence that they had changed in the ways they thought about ideas or issues:

> When I looked at their journal writing, I was looking to see, you know, some development of them really thinking about what they had done. . .or what they'd experienced, and how it had impacted them, how it had maybe changed them or made them think about something differently.

Finally, a mathematics teacher theorized, "If you just work problems, methodically work problems, then you learn how to work that problem. But if you learn how to reflect on an equation, then you really learn how to answer a lot of problems."

Accurate self-assessment. Mastering the facility to accurately assess one's own efforts is an important outcome of reflection, and participants at many sites said they looked for evidence of this competence when evaluating their students' understanding of reflection. One participant explained that she looked for her students' self-assessments on a rubric to be in line with her own assessment of their work:

> If I ask them in addressing a rubric, how they think they did—because I have my scoring of their oral exams, and then they score themselves—I think if they come pretty close to what I think they did, that's a very good reflection.

Similarly, a chemistry teacher who implemented peer evaluation in her class, shared that she compared all scores on an individual student's assignment to see how well they aligned, over time:

> Once I see all three scores. . .you know, their score, the student's peer score, and then my score, how much of a gap is there between the three of them? So if over time, there is a smaller and smaller gap difference, one, they're being more self-reflective, two, they're probably using the rubrics to be you know, self reflective in that sense. . . .So if that gap is changed—you know it is decreasing over time, then yes, they are clearly looking at themselves better.

Interestingly, some participants expressed that the quality of student in the DP was such that assessment of their understanding of reflection was unnecessary: "The truth is that, when you're dealing with these high level students, they do everything you ask them to do. . . .So I really don't do too much assessment with the reflection."

Evidence of critical thinking.   A few participants expressed that they assessed their students' reflective thinking based on the extent to which assignments demonstrated evidence of critical thought. Explaining that "you just sort of know it when you see it, one English teacher delineated her assessment strategies as follows:

> If they're reflecting in writing, I have to evaluate, like, the level of superficial analysis they have with themselves. . . .[I tell them] I'm looking now for critical thought on yourself or critical thought on your own work. . . Looking for something that's not superficial. I guess I'm looking for a level of insight and critical thought and perception. . . .If they're reflecting or trying to, you can tell."

Benefits of Reflective and Reflective Thinking for DP Students

Despite the challenges of encouraging students to be reflective thinkers, teachers and administrators across the case study sites agreed that reflective was "one of the most important attributes" for the

academic and social development of their DP students. We identified two prevalent themes across the case study sites related to benefits of reflective and reflective thinking for DP students: (a) academic benefits and (b) psycho-social benefits.

Academic benefits. Participants at many of the sites believed that reflective thinking helped their students to understand their learning from a more constructivist model, as well as their responsibilities toward their learning in a constructivist environment, as delineated by one participant:

> Learning isn't just what you are presented and given from supposedly the font of knowledge that are the teachers. It is you, learning about yourself and learning your strengths and weaknesses as a student, as a learner, as a person, and in every facet of your life."

Other participants posited that reflective thinking gave their students "a sense of their own personal accountability" and allowed them to evaluate their own academic progress. One participant explicated as follows:

> A grade is nothing but a number, but they can actually tell you exactly how they're doing, what they're doing about it, because they're constantly thinking about their own thinking, and they understand where their strengths and their weaknesses are."

Psycho-social benefits. Many participants theorized that reflective thinking had potential to result in psychosocial benefits for their students. For example, one participant asserted that reflective thinking created "better citizens" of the DP students: "I think it makes them informed, and I think it makes them more level-headed because they can think about trial and error process, they can think about things that worked for them, things that didn't work for them."

Other participants expressed that reflective thinking helped their students think outside the context of their own experiences and recognize the complexity of humanity:

> I think we really are teaching kids to see how complex, how complicated humanity is at large, and the way that we interrelate, and the way that we all struggle together, and the way that we have common goals and dreams, and that's –you know—part of bringing in that international mindedness piece.

Still other participants believed that reflective thinking encouraged students to critically examine their own beliefs and judgment, thus becoming more tolerant of the perspectives of others. A mathematics teacher at one site, for example, offered the following explanation:

> The benefits are learning how to be accepting of multiple perspectives, how to be—how to integrate in a multicultural society, how to be accepting of themselves, how to be loving of themselves, to be forgiving of themselves, to find out it's okay not to be perfect.

Correspondingly, a history teacher at a second site offered this opinion:

> It prevents oversimplifications of—of other people and of topics that are complex. I think if you're reflective, then you can—you can recognize your—the limitations of your knowledge or the ways in which you are or are not special or different. . .I think it's tied into being a good, informed citizen, and tolerance, and being open minded."

Finally, an IB coordinator at a third site asserted, "I think it's one of the necessary characteristics of maturing and maturity, that we be reflective thinkers."

Summary and Implications

Summary

Originally established in 1968 as an educational programme for geographically mobile students enrolled in international schools, the IB is a non-profit educational foundation that offers a highly respected international curriculum to its students through four IB programmes: the Primary Years Programme (PYP), the Middle Years Program (MYP), the Diploma Programme (DP), and the Career-Related Programme (CP). IB programmes have grown significantly since the IB's inception and today are provided to more than 1,300,000 students from socioeconomically diverse backgrounds in 4,267 public and private schools across 145 countries. All IB programmes encourage academic and personal achievement, inspiring students to excel in their studies and in their personal growth (IBO, 2015a).

The mission of all IB programmes is to encourage students across the world to become "active, compassionate and lifelong learners who understand that other people, with their differences, can also be right" (IBO, 2015e). IB programmes, including the DP, support student attainment of a range of 10 academic and non-academic attributes that are collectively described as the Learner Profile (IBO, 2015c). Representing targets and values that become part of a school's culture and ethos when the institution is authorized as an IB World School, the IB Learner Profile converts the mission statement of the IB into learning practice for IB learners and into exemplars that focus the work of teachers and schools, explicitly delineating a list of 10 academic and non-academic qualities the IB strives to inculcate in its students in order for them to develop as life-long learners (Hill, 2012). IB learners strive to be (a) inquirers, (b) knowledgeable, (c) thinkers, (d) communicators, (e) principled, (f) open-minded, (g) caring, (h) risk-takers, (i) balanced, and (j) reflective (IBO, 2015f). Schools are expected to consider how structures and systems, curricula, and units of work can enable students to develop into the learner described in the profile.

The purpose of the present study was to examine the Learning Profile attribute, reflective, by exploring how reflective is interpreted in DP programmes, how it is integrated into instruction and activities, how it is assessed, and how it benefits DP students. Researchers from the Education Research Center at Texas A&M University (ERC at TAMU) employed a 4-phase, mixed methods design as the framework for

the study: (a) exploration of reflective thinking in the research literature, (b) examination of reflective thinking in IB DP schools, (c) investigation of strategies and policies that facilitate reflective thinking in IB DP schools, and (d) comparisons of select IB DP schools in order to develop detailed case narratives of case study sites successful in the integration of reflective thinking in instruction and practice.

In the exploration stage, the research team conducted a best-evidence synthesis review of the literature (Slavin, 1986, 2009) on student reflection across content areas and encompassing Grades 7–12 settings in order to identify theoretical approaches and practical aspects of reflective. Overall, many contradictory findings were identified related to reflective thinking. This may be a result of the fact that the construct is under-researched in the education field or due to the difficulty in measuring reflective thinking and the lack of a clear, agreed-upon definition. The literature review revealed that researchers interpret the construct of reflective thinking in various ways, ranging from different cognitive skills and abilities to cultural perceptions. Reflective thinking, therefore, represents cognitive mental processes as well as affective measures. Currently, studies view the two interpretations as separate. Our review, however, did show that reflective thinking occurs in the instructional practices of teachers, although the results are mixed on how this process affects students. One consistent finding among studies, however, is that the teacher heavily influences how students interpret reflective thinking: When teachers modeled and encouraged students to practice reflective thinking, students' achievement and skills in reflective thinking improved.

Finally, the literature described many benefits of reflective thinking, including increases in student achievement, more cultural awareness, and deeper understanding of content material. Ultimately, we found that reflective thinking is difficult to assess, due in part to the lack of instruments capable of measuring the construct and the complexity of the concept. Although instruments have been developed for collecting perceptual data and Likert-type scales exist for measuring the construct, they are based upon self-report data. Observation instruments also exist to examine the phenomenon of reflective thinking, but they cannot investigate the cognitive processes involved. Further research on reflective is needed, with clear goals of (a) better defining the exact process that results in student reflective thinking and (b) creating instruments for accurately and objectively assessing reflective thinking.

In the identification phase, researchers worked with the IB's research department to identify a large sample of IB DP schools in the US and Canada (n = 837) as potential recipients of the Reflective Instruction Survey for Teachers and Administrators (RISTA). The RISTA consisted of open- and close-ended items targeting respondents' interpretation of reflective and perceptions of ways in which reflective is integrated in instruction and activities. Survey items were derived from the review of literature on reflective thinking, reflection, and self-regulated learning (Davis, 2003; Kember et al, 2000; Lim, 2011; Montalvo & Torres, 2004; Schunk & Zimmerman, 1998; Wilson & Bai, 2010).

Schools were chosen to participate in the study via a multi-step process that identified schools located within the US or Canada with an established Diploma Programme and in which English was utilized as the primary language for instruction. Schools were further sorted by application of stratifying criteria,

resulting in 213 schools that were invited to participate in the study. Of the 213 schools contacted, 31 responded affirmatively and provided email addresses for teachers and administrators to receive the survey.

In the examination phase, ERC researchers administered the RISTA to teachers and administrators (*n* = 802) in 31 DP schools in the US and Canada. Survey results were used to identify ways in which the sample of DP teachers and administrators interpreted reflective and the significance of the attribute in the written, taught, and learned curriculum. Because DP administrators at many schools had taught, or continue to teach, DP courses, both teachers and administrators were presented with all survey items. Survey responses were also used to identify six schools that had successfully integrated instruction of the attribute reflective, and in-depth case studies were conducted at these sites.

The RISTA included 13 items related to respondents' interpretation of reflective. Data analysis was centered on two scales that were constructed based on the broad themes from which the survey questions were drawn: (a) reflection on cognition and (b) reflection on self. Analysis of responses for the reflection-on-cognition items revealed statistically significant differences on three items, among the three groups surveyed. The IB DP administrators were significantly more likely than IB DP teachers teaching IB courses only to perceive reflective thinking as a skill that could be most effectively taught through practice of an iterative cycle of steps or through practicing reflective strategies. In addition, IB DP administrators were significantly more likely than both groups of IB DP teachers (IB-only or IB and non-IB both) to believe that reflection is most effectively taught through explicit instruction of the concept. Analysis of responses for the reflection-on-self items also revealed a significant difference among the three groups, on one survey item. The IB DP faculty, whether teaching IB courses only or a combination of IB and non-IB courses, were significantly more likely than administrators to perceive that reflective thinking involves examining personal knowledge related to a problem. These results indicate that to some extent, teachers and administrators have varying interpretations of reflective, which may be due to the different roles that DP teachers and administrators perform.

Respondents to the RISTA were also asked 17 questions related to their perceptions of ways in which instruction in DP classes in their individual school supports student reflection. We constructed two scales based on the broad themes from which the survey questions were drawn: (a) instructional practices focused on connecting to the beliefs of self or peers and (b) instructional practices focused on connecting to activities and experiences. Analysis of data from the connecting to the beliefs of self or peers items revealed no significant difference among the three groups. Results for the connecting to activities or experiences items, however, revealed a significant difference on one item among the three groups: Both groups of IB DP teachers (IB only and IB and non-IB) were significantly more likely than were administrators to engage in instruction that directed students to make drawings or sketches to help them understand what they were studying. As noted previously, this difference may be due to the variance in roles performed by teachers and administrators.

A final question on the RISTA asked respondents to consider the degree of emphasis their individual Diploma Programme places on each of the 10 IB Learner Profile attributes, using a 5-point scale, with 1 =

no emphasis and 5 = *a great deal of emphasis*. Findings indicate that although there do appear to be some differences in perceived levels of emphasis placed on different Learner Profile attributes by survey respondents in different roles, the respondents collectively are not significantly different from one another with regard to Learner Profile emphasis. Both teachers and administrators perceived that their DP placed moderate to high levels of emphasis on most of the 10 Learner Profile traits.

As part of the selection process for the case study sites, we specifically examined the overall mean score of each school in regard to perceived emphasis on the attribute reflective. Schools with a mean score of 4.30 or above were identified as more engaged with reflective instruction as implied by their self-rating of this item, and 2-day site visits were conducted in spring 2015 with six schools in the US and Canada identified as having a higher level of engagement with reflective thinking. Quantitative and qualitative data were collected at each site via structured classroom observations, surveys of DP students, and semi-structured interviews with teachers and administrators affiliated with the DP in any capacity, and individual case narratives were developed for each case study site

In the final phase, comparison, researchers conducted a cross-case analysis to explore policies and practices across the case study sites that facilitate or inhibit student engagement with reflective thinking and identify learning outcomes that DP administrators, teachers, and students ascribe to reflective thinking. The final analysis also provides a rich description of the case study sites, with emphasis on site-specific outcomes identified as emerging from interpretations of reflective and strategies for integrating reflective thinking.

Structured observations (*n* = 97) were conducted in multiple DP classrooms across subject areas at all case study sites. Results of analysis of observational data related to reflective instructional practices revealed significant differences between case study sites for three reflective instructional practices: *encouraging extended student responses, modeling thinking for students,* and *connecting new material to previously learned material.*

DP students (*n* = 205) at each case study site were administered the IB–Student Reflective Thinking Questionnaire IB–SRTQ during the site visits. The survey utilizes 4 sub-scales of reflective thinking, ranked by depth of reflection: *habitual action*, *understanding*, *reflection*, and *critical reflection*. Analysis of survey responses revealed statistically significant differences between sites on each of the four scales. Overall mean scores for the *habitual action* scale were lower than those for any other scale, indicating that DP students at all sites identified less strongly with *habitual action* than with the other three scales. Conversely, the overall mean score on the *understanding* scale was the highest of any of the four scales, indicating that DP students surveyed felt most strongly that DP courses required an understanding of concepts and course content.

Qualitative data collected during semi-structured interviews at the case study sites were examined across cases to determine common themes related to participants' definitions/interpretations of reflective, instructional strategies to encourage reflection in the DP students and to assess students' understanding of reflective, and the benefits of reflective and reflective thinking for DP students in the

case study schools. Respondents identified three themes related to definitions of reflective: reflective thinking as a tool for academic growth, reflective thinking as a tool for personal growth, and reflective thinking as a tool for metacognition.

Reflective thinking was identified as a tool for academic growth to a great extent at all sites we visited. To some extent, however, it was the theme discussed in the most superficial terms, using reflection as a synonym for review. Some participants, for example, described reflection as a process of "going back and looking at your mistakes," or "Definitely just looking at things you've done in the past." Participants at most sites also considered reflection to be a tool for personal growth. One teacher, for example, described reflection as a process of "digging deeper and reflecting upon. . .how that has affected me as a person." Finally, reflective thinking as a tool for metacognition was a final theme evidenced at some, but not all, sites.

Participants identified several strategies in regard to integrating reflective into instruction. First, participants in all case study sites used a variety of collaborative strategies, such as peer-to peer reflection and think/pair/share, to encourage reflective learning in their classes. Participants across all sites also identified class discussion, ranging from open discussions to "more formal Socratic discussions" as a valuable tool for integrating reflective thinking into their teaching. Many teachers, in all subject areas and across all the case study sites, also discussed using logbooks, reader response journals, and post-performance reflective journals to encourage reflection. Lastly, many participants reported that they used some form of evaluation tool to provide a framework to encourage students to reflect on their own work and on their peers' work as a way of integrating reflection into their instruction.

Finally, despite the challenges of encouraging students to be reflective thinkers, teachers and administrators across the case study sites agreed that reflective was "one of the most important attributes" for the academic and social development of their DP students. Two prevalent themes were identified across the case study sites related to benefits of reflective for DP students: academic benefits and psychosocial benefits. First, participants at many of the sites believed that reflective thinking helped their students to understand their learning from a more constructivist model, as well as their responsibilities toward their learning in a constructivist environment, as communicated by one teacher: "Learning isn't just what you are presented and given from supposedly the font of knowledge at are *[sic]* the teachers." Other participants theorized that reflective thinking had potential to result in psychosocial benefits for their students, such as helping them think outside the context of their own experiences and critically examine their own beliefs and judgment. One participant, for example, concluded: "We really are teaching kids to see how complex, how complicated humanity is at large, and the way that we interrelate, and the way that we all struggle together, and the way that we have common goals and dreams."

Implications

Results of this study point to several implications regarding the definition and measurement of the attribute, reflective, as well as professional development related to reflective instruction for IB DP teachers. Our literature review revealed that reflective thinking is multi-faceted construct that comprises metacognitive, cognitive, behavioral, and motivational processes. In addition, reflection is impacted by environmental and age-related factors. More research, therefore, needs to be conducted on how these processes interact in reflective instruction in order to more clearly define the process of student reflective thinking for practitioners. In addition, although a large body of research argues for the inclusion of student reflective thinking in K-12 schools, there are few established instruments available to accurately measure this construct, with the majority of instruments relying on self-report data or student portfolio use. Validation studies need to be conducted in order to develop more instruments that can accurately, reliably, and efficiently assess student reflective thinking.

Purposeful inclusion of reflective thinking strategies in instruction requires extensive teacher knowledge regarding how to encourage reflection in students. For example, the use of formal reflective instructional practices, such as Socratic seminars, was not frequently observed during our period of data collection. As such, this may be an area where the IB could provide further professional learning to DP schools and teachers regarding instructional practices targeted specifically at encouraging reflective thinking in students. In addition, professional development on integrating reflective instruction across all content areas would be of benefit to teachers in non-reading or writing intensive courses where student reflection may seem more challenging.

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Appendix A:
Reflective Instruction Survey for Teachers and Administrators (RISTA)

Part I: Demographic Information

1. After reading the information provided above, please indicate whether or not you choose to participate in the study.
    a. I choose to participate in the study by completing the online survey.
    b. I choose **NOT** to participate in the study.

2. In which state/province are you currently teaching or employed as an administrator?

3. At which school are you currently teaching or employed as an administrator? \

4. Which of the following best describes your current primary role?
    a. Teacher
    b. Administrator

5. What is your highest level of education completed?
    a. B.A./B.S.
    b. Master's degree
    c. Ph.D./Ed.D.

6. Including this year, how many years of teaching experience do you have?

7. Including this year, how many years have you been an administrator at this school?

8. Which of the following best describes the classes you currently teach?
    a. IB classes only
    b. IB and non-IB classes
    c. Non-IB classes only

9. Including this year, how many years of experience do you have teaching in an IB Programme?

10. What subject(s) do you currently teach?

    a. Language & literature
    b. Language acquisition
    c. Individuals and societies,
    d. Sciences
    e. Mathematics
    f. The arts
    g. Other

11. Do you have students in your classroom who are English language learners? (An English language learner is a student whose native language is not English, who is learning English as a second language).
    a. Yes
    b. No

Part II: Interpretation of Reflective

Indicate the extent to which you agree with the following statements in regard to your understanding or interpretation of reflective (also referenced as reflection and reflective thinking): Strongly disagree (SD), Disagree (D), Agree (A), or Strongly agree (SA).

	SD	D	A	SA
1. Reflection can be most effectively taught or encouraged through explicit instruction of the concept.	O	O	O	O
2. Reflection can be most effectively taught or encouraged through practice of reflective thinking strategies.	O	O	O	O
3. Reflection can be most effectively taught or encouraged through practice of an iterative cycle of steps for problem solving.	O	O	O	O
4. Reflection can be most effectively taught or encouraged through practiced awareness of one's and others' beliefs and values.	O	O	O	O
5. Reflection is a set of metacognitive activities or skills that helps students understand their own thinking.	O	O	O	O
6. Reflection involves identifying a problem	O	O	O	O
7. Reflection involves examining personal knowledge related to a problem.	O	O	O	O
8. Reflection involves experiencing action and/or new insights.	O	O	O	O
9. Reflection is the practice of being critically aware of personally held stereotypes and biases.	O	O	O	O
10. Reflection is most essential to developing students' self-regulated learning.	O	O	O	O
11. Reflection is most essential to developing students' critical thinking skills.	O	O	O	O
12. Reflection is most essential to developing students' problem-solving skills.	O	O	O	O
13. Reflection is most essential to developing students' intercultural awareness and tolerance.	O	O	O	O

Open–ended question

Please share any aspects of your interpretation of reflective thinking not captured by the above statements.

Part III: Instructional Practices

Indicate the extent to which you agree with the following statements: Strongly disagree (SD), Disagree (D), Agree (A), or Strongly agree (SA)

	SD	D	A	SA
14. In my DP classes, students practice basic skills so many times they are able to do them without thinking about it. [R]	O	O	O	O
15. Instruction in my DP classes validates students' firmly held ideas about the world. [R]	O	O	O	O
16. As long as students can remember facts from class activities and notes, they are able to make good grades in my DP classes. [R]	O	O	O	O
17. Students in my DP classes are encouraged to question the way others do something, as a basis for changing their own practices.	O	O	O	O
18. Students in my DP classes are encouraged to think about what they are doing in order to complete assignments or activities.	O	O	O	O
19. I provide students in my DP classes with opportunities to think over their experiences in order to learn from them.	O	O	O	O
20. Learning in my DP classes encourages students to change the way they look at themselves.	O	O	O	O
21. Participation in my DP classes challenges students' firmly held ideas.	O	O	O	O
22. Instruction in my DP classes challenges students' normal way of doing things.	O	O	O	O
23. Often during instruction in my DP classes, students discover misconceptions or faults in what they had previously believed to be right.	O	O	O	O
24. Instruction in my DP classes requires extensive time spent thinking over experiences related to the activity.	O	O	O	O
25. Students in my DP classes ask other students to explain their ideas.	O	O	O	O
26. Students in my DP classes listen carefully to the ideas of other students.	O	O	O	O
27. I often assess reflective thinking by listening to the exchange of ideas among my DP students.	O	O	O	O
28. I instruct my DP students to make drawings or sketches to help them understand what they are studying.	O	O	O	O
29. I encourage my DP students to find connections between what they are learning and their own experiences.	O	O	O	O
30. I often assess reflective thinking by evaluating the extent to which students are able to make connections between what they are learning and applications of what they are learning to their everyday life.	O	O	O	O

31. Students in my DP classes are taught to think through an assignment to decide what they are supposed to learn from it rather than just reading over it when studying.	O	O	O	O
32. I often assess reflective thinking by evaluating a DP student's synthesis of ideas in a summary written in the student's own words.	O	O	O	O
33. I instruct reflective thinking in my DP classes by encouraging students to plan and follow a study schedule.	O	O	O	O
34. Students in my DP classes only study when there is the pressure of a test. [R]	O	O	O	O
35. When a long-term project is assigned in my DP classes, part of the assignment is a timeline with interim tasks and deadlines identified.	O	O	O	O

Open-ended question

Please share any instructional practices you use to encourage reflective thinking, not captured by the above statements.

Part V: Emphasis on Learner Profile Attributes

Please rate each of the following 10 Attributes of the IB Learner Profile according to the emphasis your DP program places on each, with 1 = the least emphasis and 5 = the most emphasis:

Attribute	1	2	3	4	5
Inquirers	O	O	O	O	O
Knowledgeable	O	O	O	O	O
Thinkers	O	O	O	O	O
Communicators	O	O	O	O	O
Principled	O	O	O	O	O
Open-Minded	O	O	O	O	O
Caring	O	O	O	O	O
Risk-Takers	O	O	O	O	O
Balanced	O	O	O	O	O
Reflective	O	O	O	O	O

Appendix B:
Observation of Features for the International Baccalaureate Program

School _____ Teacher _____ Grade Level_____ Content Area_____

Observer_____ Observation Date_____ Begin Time_____ End Time_____

At the end of the complete classroom observation, indicate (i.e., check) to what extent each of the following activities was used or demonstrated during the observation period.

Rating Scale:

1	2	3
Not observed at all	Some extent Observed once or twice	Great extent Observed 3 or more times

	1	2	3
INSTRUCTION			
1. Engaged (generated interest, assessed prior knowledge)			
2. Explored (discovered new skills, key concepts, probed)			
3. Explained (connected prior knowledge to new learning			
4. Elaborated (applied new learning to similar situations)			
5. Evaluated (assessed understanding formally and informally)			
6. Teacher connected ideas and concepts			
7. Teacher initiated experiences, discussions and activities			
8. Teacher acted as coach/facilitator			
9. Teacher allowed students to develop concepts or procedures			
10. Teacher provided students options for problem solving			
11. Teacher provided feedback (answers, information, etc.)			
12. Teacher assisted students to organize thinking (identify and describe patterns)			
13. Teacher assisted students in generalizing learning to other situations, problems, etc.			
14. Teacher integrated technology into lesson			
15. Teacher integrated feedback and assessment into instructional cycle			
16. Teacher distributed feedback evenly			
17. Teacher redirected student thinking			
18. Lesson began with what students already know from home, community, and school			
19. Teacher provided opportunities for students to assume responsibility and initiate classroom activitie			
20. Teacher assisted students in connecting and applying their learning to home and community			
21. Teacher provided opportunities for parents/families to participate in instructional activities			
22. Teacher varied activities to include students' preferences			
23. Teacher varied styles of conversation and participation to include students' cultural preferences			
24. Teacher provided opportunities for students to learn about their global environment			
25. Teacher provided opportunities for students to learn about physical, social, and emotional health			
26. Teacher provided opportunities for students to develop creativity			
STUDENT			
1. Students initiated and assumed responsibility for experiences, discussions, and activities			
2. Students connected ideas and concepts			
3. Students demonstrated meta-cognitive strategies			
4. Students utilized different ways to answer (alternative solutions)			
5. Students participated in problem solving			
6. Students used technology to learn 21st century skills (e.g., problem solving, creativity)			
7. Students used technology to learn basic skills (e.g., drill & practice)			
8. Students were engaged in classroom activities			
9. Student activities were learner centered			

PLEASE WRITE YOUR FIELD NOTES ON THE OTHER SIDE OF THIS FORM

Appendix C:
Teacher Roles Observation Schedule—IB

School _____ Teacher _____ Grade Level_____ Content Area_____

Observer_____ Observation Date_____ Begin Time_____ End Time_____

Students _____

(30 second time intervals)	1	2	3	4	5	6	7	8	9	10	Total
INTERACTIONS (check one)											
1. No interaction											
2. With student(s) (instructional)											
3. With student(s) (managerial)											
4. With student(s) (social, personal)											
5. With student(s) (collaborative)											
6. Other _____											
SETTING (check one)											
1. Whole class instruction											
2. Small group instruction (more than 1 student)											
3. Individual											
4. Traveling											
5. Other _____											
REFLECTIVE INSTRUCTIONAL PRACTICES (check all observed											
1. Focus on content (i.e., subject area content)											
2. Focus on process											
3. Focus on product (e.g., outcome)											
4. Connect content to other disciplines											
5. Connect content to global communities											
6. Solicit multiple perspectives on topic											
7. Encourage students to collaborate											
8. Encourage students to question their own ideas											
9. Encourage students to listen to others' ideas											
10. Encourage students to question others' ideas											
11. Encourage students to explain their ideas to others											
12. Provide time for students to reflect											
13. Encourage extended student responses											
14. Model thinking for students											
15 . Emphasize intrinsic value of tasks											
16. Highlight main/important points											
17. Connect new material to previously learned material/c											
NATURE OF INTERACTION (check all that are observed)											
1. Questioning (Process)											
2. Questioning (Content)											
3. Explaining											
4. Commenting (e.g., general discussion about sports)											
5. Listening											
6. Cueing or prompting											
7. Modeling/Demonstrating											
8. Other (specify)											

Appendix D:
IB Student Reflective Thinking Questionnaire (SRTQ-IB)

Sex:　　　O male　　　　O female

Which best describes your ethnicity?
O American Indian/Alaskan Native　O Asian/Pacific Islander　　　　O Latino(a)
O African-American　　　　　　　O White, not of Hispanic descent
O Other (please specify)_____

Please indicate your level of agreement with the following statements about your actions and thinking in your Diploma Programme (DP) courses, using the scale 1= strongly disagree, 2= disagree, 3= agree, 4= strongly disagree.

	1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
When I am working on some DP course activities, I can do them without thinking about what I am doing.	O	O	O	O
Our DP courses require us to understand concepts taught by the teachers.	O	O	O	O
I sometimes question the way others do something and try to think of a better way.	O	O	O	O
As a result of my DP courses, I have changed the way I look at myself.	O	O	O	O
In my DP courses, we do things so many times that I sometimes do them without thinking about it.	O	O	O	O
To pass a DP course, you need to understand the content of the course.	O	O	O	O
I like to think over what I have been doing and consider alternative ways of doing it.	O	O	O	O
My DP courses have challenged some of my firmly held ideas.	O	O	O	O
As long as I can remember handout material for examinations, I do not have to think too much.	O	O	O	O

I need to understand the material taught by my DP teachers in order to perform practical tasks.	O	O	O	O
I often reflect on my actions to see whether I could have improved on what I did.	O	O	O	O
As a result of my DP coursework, I have changed my normal way of doing things.	O	O	O	O
If I follow what the teachers say, I do not have to think too much in my DP courses.	O	O	O	O
In DP courses, you have to continually think about the material you are being taught.	O	O	O	O
I often re-appraise an experience so I can learn from it and improve for my next performance.	O	O	O	O
During my DP coursework, I have discovered faults in what I previously believed to be right.	O	O	O	O

Adapted from Kember et al. (2000). Development of a questionnaire to measure the level of reflective thinking. *Assessment and Evaluation in Higher Education, 25*(4), 381-395.

Appendix E:
IB Reflective Interview Protocols for Teachers and Administrators

Date: _____ Participant's name: _____ Institution/District/State/Country_____

Participant's current role/position/content area(s): _____

Number of years experience in (a) PK-12ducation: _____ (b) an IB program _____

1. Please tell me about your experience teaching in an IB Diploma Programme.

2. What preparation did you receive prior to becoming a teacher in the IB DP?

3. (a) Please describe any PD you have received since becoming an IB DP teacher.
   (Probe: If the respondent doesn't mention PD related specifically to the IB Attributes: Please describe any PD you have received that specifically addresses the IB Attributes.)

4. How would you define/interpret the IB attribute "reflective?"

5. Please describe some specific strategies that you implement to integrate reflective thinking into your instruction and activities.

6. Please describe strategies you use to assess your students' understanding of "reflective."

7. What are some ways in which your students exhibit reflective thinking?

8. In your opinion, what are the benefits of "reflective" and reflective thinking for your DP students?