Improving Learning

DEVELOPING A TEACHERS' ASSESSMENT LITERACY AND DESIGN COMPETENCE FRAMEWORK

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ACER

COMPANY INFORMATION

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Executive Summary

Within IB programmes, teachers play a central role in facilitating learning and empowering learners. One of the key competencies required by teachers to be able to support high quality learning is for assessment, teaching and learning in their classrooms to work collectively. Teachers must possess a high level of assessment literacy to properly fulfil their role of supporting teaching and learning. Teachers' assessment literacy can have an impact on the quality of educational provision.

The aim of this study was to develop an assessment literacy and design competency framework for use across IB programmes and professional learning resources. The following key research question and its sub-components were:

1. What is the state of the field for teacher assessment literacy and design development?

a) What are the skills, knowledge and attitudes that teachers need for quality development of assessments?
b) What factors impact the development of teacher's assessment literacy and design competence?
c) What are best practice curriculum design principles for professional development to aid teacher's development of assessment literacy and design competence?
d) How does the advent of digital assessment impact teachers' assessment literacy and design competence?
e) What are the most advanced policies, programmes and practice models supporting the development of assessment literacy for teachers at the global level?
f) What are the success factors and challenges in implementing programmes for teachers' assessment literacy?

Methodological approach

This project has sought to develop an assessment literacy and design competency framework. Several discrete but interconnected activities were undertaken for this project, primarily between August 2020 and June 2021:

- A literature review and considerations in the context of assessment literacy
- A scan of IB documents that illuminates their current guidance towards teacher assessment literacy and design competency, and

- Consultations with IB subject and curriculum managers, assessment experts and senior staff.

Together, these elements amassed a very large amount of data and this report both presents the key findings from each component as well as synthesising the components in order to derive conclusions and recommendations.

Literature review

The purpose of the literature review was to undertake an in-depth search of academic and grey literature to find an answer to the research questions. This involved the synthesis of insights from several hundred sources, a combination of academic research, practical examples and other sources of useful background information. It helped identify key assessment literacy themes for supporting teachers' assessment literacy across all IB programmes. The literature review was designed as a useful and accessible resource for teachers, programme coordinators, and school leaders.

The literature review provided a good overview of the key literature on teachers' assessment literacy. One of the key elements emphasised in much research is the need for assessment, teaching and learning to work in concert with each other and, indeed, their indivisible nature.

Hattie famously identified that teacher assessment practices are the interventions with the highest potential to enhance learning. The review contributed important insights into critical elements for inclusion in the assessment literacy and design competency framework that was the next phase of the project.

Expert document review of IB programme and subject guides

In addition to a review of relevant scholarly literature, this research incorporated a document review designed to contextualize current indications towards teacher assessment literacy and design competence in IB programmes. This helped understand the context in which assessment literacy and design competence are embedded in the IB.

The document review complements the findings of the literature review and embeds its themes into the wider IB context; this supported the development of an assessment literacy and design competency framework for use across IB programmes and professional learning resources.

ACER researchers worked with IB to identify the list of all interactive and non-interactive resources and

professional development opportunities relevant to this topic. The final list of documents was designed to provide a balance of IB resources aimed at all stakeholders in an IB school community. Therefore, documents ranged from the whole-school multiple-programme level (e.g., Programme standards and practices aimed at programme coordinators and school leaders) through to the individual classroom level (e.g., support materials aimed at individual teachers), and were inclusive of all four IB programmes at all levels. Each document was identified based on its value as a directly-accessible resource for IB practitioners.

Hypothetical 'teacher profiles' were created to include the IB documents and experiences teachers would be familiar with after 3-5 years teaching in a programme. These profiles illustrated the potential teacher experience of IB information and messaging around assessment literacy. The profiles assumed teachers had support from their school (i.e., professional learning time, resources) and a reasonable level of teacher engagement with and commitment to the IB programme(s).

Consultations with IB staff

The aim of the focus groups was to ensure that the framework is appropriately contextualised for IB programmes. The framework needs to be relevant to teachers in all IB programmes. This means that the framework should be comprehensive, but also enable tailoring to reflect different assessment practices in each programme.

Three focus groups with IB staff included the Learning & Teaching group, the Assessment group, and the Professional Development group. In addition, the framework was shared with many IB subject experts and senior staff across the organisation for their written feedback.

Participants were asked about their views on several elements of the framework, both in terms of the expectations it sets, the way it is structured, the methodology it puts in place, the resources it identifies and its overall format.

Main findings

Assessment literacy is defined as all aspects relating to teachers' assessment competence, based on theories of assessment, sound practices, socio-cultural understandings and how these are embedded within the educational context.

A draft framework was developed to summarise key competencies, and approaches to gaining them, required

by teachers to improve assessment literacy; subsequently, consultations with IB staff on the draft framework was undertaken. The framework summarises the scope of assessment literacy that needs to be addressed within the IB. It is designed to target programme leaders, school leaders, programme coordinators, subject coordinators and those who design and implement professional development opportunities.

The framework provides a description, methodology (the attitudes, behaviours, knowledge, and skills related to this element of assessment literacy) and resources for each of the main elements already identified. The resources are intended to be those beyond what are included in IB documents and include exemplar resources, courses, and other reference materials.

The framework has seven elements of assessment literacy. These are:

- Assessment Knowledge and Skills
- Formative Assessment
- Assessment Identity
- Professional Development
- School Environment
- Engagement of Learners
- Integrating Digital Assessment

The following summarises key findings related to these aspects.

Assessment knowledge and skills

The knowledge, skills and attitudes incorporated in definitions of assessment literacy are influenced by changes in attitudes towards education and assessment over time, and equally influenced by teacher career development. All teachers need to have the skills and knowledge to evaluate the extent to which assessment items can generate reliable and valid data. Teachers need to be proficient in several fundamental areas of assessments, such as developing and grading rubrics for open response tasks, using assessment data to monitor learner progress and to identify ways to enhance learning, and to utilise results from assessments to inform their own teaching practices.

Formative assessment

Formative assessment is regarded as a backbone of good teaching. It is important that all teachers are aware of the philosophies that underscore these assessments and the tools appropriate to meet that objective. The expectations are that teachers can design and implement a range of assessment activities to suit the diversity of learner needs and preferences.

For IB teachers, this includes not only getting their learners to demonstrate skills and knowledge in curricula

areas, but also attributes in the IB Learner Profile, with focus on 21st century skills such as digital literacy; social skills; collaboration; self-initiative; creativity; and critical thinking.

Assessment identity

Assessment literacy is multi-dimensional construct that includes affective elements that shape the role of teachers in assessment. Teachers' feelings, emotions, values, and beliefs about assessment derive from their own personal experiences. Having positive beliefs and attitudes about the role that assessment plays in improving learning, as well as confidence and belief in their assessment skills are an important part of their identity.

In addition, they need to be aware of the legislative requirements and the cultural expectations for assessment in the contexts in which they teach. Aligning their assessment practices with the relevant context is of crucial importance.

Professional development

Having support and encouragement from school leaders can greatly enhance teachers' professional development. Teachers should feel free to try out innovative and experimental approaches to assessment in their professional practices and have access to expertise to do that.

Schools can create enabling structures for assessment literacy among teachers; this is important because there is often a lack of alignment between teachers' assessment strategies and principles set out in official school policies. Continuous access to good quality professional learning opportunities will ensure that teachers employ best practices and approaches to assessment.

School environment

In supportive environments, schools create enabling structures for assessment literacy among teachers. Supportive environments are those in which school leaders clearly articulate the importance of using data to inform improvements.

Data-informed decision making is important for school improvement and one way to empower teachers to optimise data use in schools is by using data teams. These teams can help analyse assessment data, design interventions and support colleagues to utilise data in informing teaching practices. Data teams should be comprised of teachers and school leaders, and they should work together to interpret data and implement interventions based on evidence.

Engagement of learners

In addition to developing their own assessment literacy, teachers should also support learners to gain assessment literacy, by ensuring learners understand success criteria, and engage in self- and peer-assessment. This can be achieved by explaining to learners what the learning goals and success criteria are, to help them build their own assessment literacy. Using questioning, probing and other instructional practices can enhance the effectiveness of assessment by helping learners to identify their strengths and areas for improvement. Developing learners' assessment literacy is a way of embedding assessment literacy in teaching and learning. Furthermore, peer and self-assessment are important for learners to become independent learners; teachers facilitate this by modelling how to make judgements about the quality of work.

Integration of Digital Assessment

Digital assessments can improve efficiency in marking, moderating, and storing information, enabling teachers to use their resources better. They provide opportunities to assess complex knowledge and reasoning that may not be possible to assess through traditional, paper-based methods. Teachers should undergo training in digital assessment design and undertake digital assessments themselves to fully understand the demands they may place on their own learners; this should also improve their ability to design digital assessments.

Furthermore, professional development needs to constantly evolve as digital technologies evolve. Therefore, it is vital that all teachers are provided opportunities to learn about, and experience, digital assessment into the future.

Next steps

Assessment literacy has clearly evolved significantly over time and continues to evolve now. While much of the current work in assessment literacy focuses on using assessment, there is much less focus on designing assessment or interpreting its outcomes, and the kind of competencies that teachers need to have to succeed in designing, implementing and evolving assessments.

Equally, while digital technologies create new opportunities for assessment, very little attention has been paid to how teachers can make the most of digital tools in their assessment practices. More research is needed to fully evaluate how the changing nature of assessments is

impacting teachers' assessment literacy.

The next step will be for the assessment literacy framework to be implemented across the IB. This means using the framework to inform revisions to programme and subject documentation, expectations for the ways in which schools support teachers and the development of professional learning opportunities for teachers.

Perhaps most importantly, the framework needs to be workshopped with schools and teachers, identifying areas in which teachers already feel confident and those in which they have the greatest desire for professional development. As teachers and schools emerge from the Covid-19 pandemic, ensuring that assessment is central to teaching and learning will be more important than ever.

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Tables and Figures

Introduction

Educational programmes offered by the International Baccalaureate (IB) are distinctive for their focus on enabling learners to gain the competencies and dispositions that will enable them to be responsible citizens and leaders of international communities in their future lives (International Baccalaureate Organisation, 2017). They are also distinctive for their holistic nature – incorporating a focus on interdisciplinary learning, 21st century skills and learner-led inquiry.

In IB programmes – as in other educational programmes around the world – teachers play a central role in facilitating learning and empowering learners. After decades of research, much is known about the competencies needed by teachers if they are to be able to support high quality learning (see for example Koh & Chai, 2016; Pastore & Andrade, 2019).

One of the key elements emphasised in much research is the need for assessment, teaching and learning to work in concert with each other and, indeed, their indivisible nature (Ellis, 2001). Hattie (2009) famously identified that teacher assessment practices are the interventions with the highest potential to enhance learning.

For assessment to fulfil its vital role in supporting teaching and learning, it is essential that teachers possess a high level of assessment literacy (hereafter assessment literacy). Teachers' assessment literacy is known to have a huge impact on the quality of educational provision (see for example Ashraf & Zolfaghari, 2018; Cooper, 2014; DeLuca et al., 2019; Levy & Nasser-Abu Alhija, 2015; Liu & Xu, 2017; Looney et al., 2018; Mellati & Khademi, 2018).

Unfortunately, there are also indications that many teachers lack sufficient assessment literacy to optimise its value in informing educational excellence (DeLuca et al., 2016a; Y. Xu & Brown, 2016). As such there is a push to support teachers to become more assessment literate (see for example DeLuca et al., 2019; Floden et al., 2020).

Recent research has focussed on rethinking the assessment literacy construct from being purely measurement theory oriented towards seeing the need for teachers to develop assessment identities where they have to negotiate power relations in the class and school contexts, and practice assessment against the backdrop of social and cultural contexts (DeLuca, Chapman-Chin, et al., 2019; Willis et al., 2013a).

National and state level policies, professional teaching standards, and research in the assessment, teacher assessment literacy, and teacher learning domain have stressed the importance of the development and enhancement of teacher assessment literacy throughout a teacher's career.

This review is designed to support the development of an assessment literacy and design competency framework for use across IB programmes and professional learning resources. While drawing on the extensive scholarly research that has been undertaken on various topics related to assessment literacy, we have designed this review to be a useful and accessible resource for reference by teachers, programme coordinators and school leaders.

In addition to a review of relevant scholarly literature, this report incorporates a document review designed to contextualize current indications towards teacher assessment literacy and design competence in IB programmes. This involved a review of readily accessible programme, subject and teacher support materials to gain an overall picture of the context in which assessment literacy and design competence are embedded in the IB. This review does not aim to audit IB documents or assessment processes, but instead aims to illuminate current guidance and approaches to teacher assessment literacy and design competence across the continuum of IB programs.

By providing a contextual overview, the document review aims to complement the theoretical findings of the literature review. The document review embeds the themes arising from this into the wider IB context and supports the development of an assessment literacy and design competency framework for use across IB programmes and professional learning resources.

In the pages below, we identify the key assessment literacy themes that are of most significance in supporting teachers' assessment literacy across all IB programmes, particularly in an era of growing digitalisation of assessment practices.

The purpose of this review was to undertake an in-depth search of academic and grey literature to find answers to the following key research question and its sub-components:

1. What is the state of the field for teacher assessment literacy and design development?

a) What are the skills, knowledge, and attitudes that teachers need for quality development of assessments?
b) What factors impact the development of teacher's

assessment literacy and design competence?

c) What are best practice curriculum design principles for professional development to aid teacher's development of assessment literacy and design competence?
d) How does the advent of digital assessment impact teachers' assessment literacy and design competence?
e) What are the most advanced policies, programmes and practice models supporting the development of assessment literacy for teachers at the global level?
f) What are the success factors and challenges in implementing programmes for teachers' assessment literacy?

Methodology

This study comprised three key elements: a review of relevant scholarly literature, a review of relevant IB documents, and the development of a draft framework to summarise key competencies and approaches to assessment literacy. Each element included a discrete methodology, but the researchers involved in the review or development of each element maintained close communications with each other. This ensured the literature review and document analysis could provide insights to support the development of the assessment literacy framework. IB staff were consulted on the draft framework to ensure applicability for teachers in schools offering IB programmes.

Review of literature

To undertake the review of literature, review parameters were first put in place. Where possible, only literature from 2015 onwards and in English has been referenced. Exceptions have been made for seminal works and in any topic areas in which a shortage of recent literature was encountered. After several options were explored, literature was identified through two key databases: EBSCOHost Education Search Complete – Academic literature worldwide and OpenGrey.

Nine sets of key terms were used in a number of combinations:

1. (Teacher OR Teachers)
2. (educational assessment OR educational assessment tool OR educational assessment method OR educational assessing OR assess OR examination OR test)
3. (assessment literacy OR assessment understanding OR assessment knowledge OR assessment skill OR assessment attributes OR assessment competence OR assessment attitudes)
4. (Design OR Develop OR Development OR Design Principles)
5. (Professional Learning OR Professional Development OR Improvement)
6. (Good Practice OR Best Practice OR Optimal OR Success OR Challenge)
7. (Curriculum Design OR Policy OR Practice OR Programme OR Inventory OR Framework)
8. (Digital OR Online OR Automated OR Computer OR Simulation OR Animation or Database)
9. NOT (university or college or higher education)

Within this, articles that focused on ESL and that were deemed to lack broader relevance to other educational domains were excluded. Nevertheless, very large amounts of reference

material were available. For example, the combination of key terms 1+2+3-9 yielded more than three-thousand articles in the EBSCO database. In order to overcome this, key terms 4, 5, 6, 7 and 8 were searched as 'subject terms'. This reduced sources found significantly. For example, 1+2+3+4-9 initially yielded 917 results, reduced to 326 when subject terms were used.

Once the parameters had been set, individual researchers focused on specific areas of literature and these sections were then written up. Researchers made selections as they went along, focusing on the research they deemed to be of greatest relevance in the context of IB programmes. All references were saved in a shared Zotero folder. Lead researchers synthesised the different sections to ensure that a consistent voice was utilised throughout. Efforts were made to utilise various forms of summarising key points to enhance readability.

In a parallel process, ACER researchers undertook a review of International Baccalaureate documentation. The list of documents selected for review was designed to provide a balance of IB resources aimed at all stakeholders in an IB school community. Consequently, documents ranged from the whole-school multiple-programme level through to the individual classroom level and were inclusive of all four IB programmes at all levels. Anything referenced or recommended by the IB but delivered as a non-IB resource or non-IB professional learning opportunity was excluded from the review.

All IB documents were reviewed in English, with the assumption that assessment guidance has been directly translated into other language versions. The documents were selected based on their value as a directly-accessible resource for IB practitioners and were categorised into five broad categories:

1. IB continuum (all programme) documents
    - Overall guidance documents that relate to assessment in all IB programmes, for example, *Assessment Principles and Practice: Quality assessment in a Digital Age*.
    - General continuum documents, for example, *Programme standards and practices.*
2. Programme-wide documents
    - Principles into Practice documents for all four IB programmes.
    - Assessment Procedures documents for all four IB programmes.
3. Compulsory Subject-specific documents
    - Subject guides for subject groups/curriculum areas within IB programmes.
4. Subject-specific Teacher Support Material (TSM)

- Teacher support material for subject groups/curriculum areas within IB programmes.
- Specimen examination papers for the MYP and DP/CP examinations.
- Materials to support teachers in their internal examination of student outputs.

5. Workshop materials
   - Workshop catalogues.
   - Online and face-to-face workshop guidance materials.

Table 1 shows the total count of documents reviewed (n=179), disaggregated by IB Programme and subject groups. As the document scan was not intended to be an audit, only a selection of key IB documents were included in the scan. Care was taken, however, to ensure there was a spread of documents across programmes, subject groups and support areas. The lower numbers apparent in the Continuum and Career-related Programme (CP), and to a lesser extent in the Primary Years Programme (PYP), document counts are representative of the number of documents available in these categories.

Table 1: Total count of documents scanned, disaggregated by IB programme and subject group

	Continuum	PYP	MYP	DP	CP	Total
All subject groups	6	9	17	4	3	39
Group 1 Lang&Lit		2	1	3		6
Group 2 LangAcq			12	10		22
Group 3 Ind&Soc		1	6	18		25
Group 4 Sciences		1	1	11		13
Group 5 Maths		2	7	8		17
Group 6 Arts		2	3	8		13
Group 7 PSPE-PHE		2	2			4
Group 8 Design			3			3
Assessment		1	4	1	1	7
Cores & capstones	1	1	9	10	5	26
Leadership	3	1				4
Grand Total	**10**	**22**	**65**	**73**	**9**	**179**

A full list of documents scanned can be found in **Appendix 1**.

Coding Protocol

Documents selected for review were scanned using a combination of key terms drawn from the literature review, with all references to assessment coded using qualitative coding software. Dedoose was selected as a coding tool for the document review as it allowed for real time, collaborative coding and analysis across multiple reviewers. Reviewers started with 7 core categories informed by the key search terms, themes emerging from the literature review and existing knowledge of IB assessment.

Using these core themes, a series of codes was developed on an iterative basis, following the norms of a grounded theory approach (Glaser & Strauss, 1967). As per the grounded theory protocol, coding was started with open coding to categorise themes, moved to axial coding to develop relationships between codes and concluded with selective coding, in which categories are integrated to produce a cohesive picture (Glaser & Strauss, 1967).

This type of coding is suitable in the context of this project in that it allows for the 'bottom up' approach informed by grounded theory (Glaser & Strauss, 1967) in which themes emerge from the materials under review, without being coloured by preconceptions, thus enabling theoretical sensitivity (Corbin & Strauss, 2014; Glaser, 1978).

As the documents were reviewed, references to assessment policy, principles, operations and expected practices were highlighted as excerpts. One excerpt comprised a paragraph or multiple paragraphs, up to a page in length, that:

- Described or explained IB expectations related to assessment operations, practices, and procedures, or,
- Described or explained the assessment theory or principles underpinning IB assessment policy.

The former excerpt types were those typically understood as expected practice or procedure and often gave teachers specific detail on steps to follow. These excerpts included themes such as *internal assessment (IA) procedures* or *marking guidelines*. Where whole sections of an IB document referred to multiple types of assessment procedures and regulations, the excerpt was coded as the more-general *assessment operations*.

The latter excerpt types were those that typically would enhance IB teachers' capacity in assessment literacy. These excerpts included themes such as the *teaching, learning*

and assessment cycle and *assessment design*. Where whole sections of an IB document referred to multiple components of assessment theory and principles, the excerpt was coded as the more-general *assessment literacy*.

Inter-coder-reliability

Two reviewers were responsible for coding, with a third 'expert coder' (Lead Researcher) undertaking cross-coding checks to ensure consistency at set points throughout the process. Using Dedoose, reviewers worked collaboratively throughout the coding process and met at three pre-determined points during coding to refine codes and cross-code documents to ensure consistency across coders. This approach was designed to be flexible enough to allow for the iterative development of codes and for additional documents to be added to the review as was required (Braun & Clarke, 2013).

A codebook was developed (see **Appendix 4**) to define codes and reviewers participated in an initial training meeting in which a sample document was coded collaboratively to check for consistency. Cross-coding occurred at the mid-way point and end of the document review in which each reviewer cross-coded two documents to ensure consistency. The third, expert coder was involved in the cross-coding meetings to identify clarifications and/or additional codes as required (Braun & Clarke, 2013; Robson, 2011).

Once all documents were coded, data was exported from Dedoose and analysed using Excel. Reviewers liaised closely with the researchers conducting the literature review to ensure that the themes that arose from the document scan fed into the parameters of the literature review and vice-versa.

Development of a draft framework

In developing the framework, the starting point was the review of literature that identified the key elements for inclusion. Drawing on their own background as teachers (five of the eight researchers on the project team have a teaching background) this was then fleshed out to indicate how teachers could strengthen their proficiency in each element, with some suggested resources also provided.

The framework is intended to summarise the scope of assessment literacy that needs to be addressed within the IB. It is designed to target programme leaders, school leaders, programme coordinators, subject coordinators and those who design and implement professional development opportunities.

It is not the intention that every teacher should be competent in every element – that would certainly be asking too much. Each school should, however, aim to have a spread of skills and knowledge on assessment to ensure that there is advice and support available for teachers to draw upon.

Definitions of Assessment Literacy

Assessment has long been regarded as a key component of a quality education. As understandings of education have changed over time, however, so too has understanding of the roles played by assessment. A shift from the acquisition of knowledge in a teacher-dominated and didactic process towards the creation of knowledge in a trialogic and digitally-mediated process (Klenowski & Wyatt-Smith, 2014) has seen a parallel shift in assessment.

Although still dominant, written examinations have begun to yield ground to authentic tasks, application, collaboration and reflection. As this dynamic gains momentum, expectations of what 'quality assessment' is, and the skills required by teachers to facilitate it, have begun to be transformed. As with all movements in education, change has been non-linear and the rapidity of adoption of more contemporary assessment practices has been uneven.

This yields a context for assessment in which the technicalities of task design remain important but are augmented by a more holistic focus on the environment in which assessment is enacted, and the assumptions that underlie it. A constant element in assessment is the important role played by teachers, and the central question 'why assess' (Rowntree, 1987) continues to need to ground the assessment actions they take.

Evolving conceptions of assessment literacy

As understandings of learning and assessment have changed over time, so too has the definition of assessment literacy. A focus on summative assessment through formal examinations means a conception of assessment literacy for teachers that focuses on validity, reliability and statistical interpretation (DeLuca et al., 2016a; Pastore & Andrade, 2019).

As approaches to assessment take on a greater focus on learner diversity, a focus on assessment for learning becomes more prominent (DeLuca, Chapman-Chin, et al., 2019; Willis et al., 2013a; Y. Xu & Brown, 2016). As assessment practices evolve to focus on embedding assessment in learning, a focus on classroom contexts and a consideration of teachers' assessment identities is also given greater emphasis (DeLuca, Chapman-Chin, et al., 2019; Deneen & Brown, 2016; Willis et al., 2013a; Y. Xu & Brown, 2016).

In distinguishing between definitions of assessment literacy, Willis et al. (2013) highlight that these definitions are underpinned by differing assumptions as to the nature of learning, whether scientific-technicalist assumptions or socio-cultural

assumptions. To bridge these different assumptions, Pastore and Andrade (2019) draw on experts to reach consensus about the associated dimensions of assessment literacy. They find three core dimensions of assessment literacy:

- Conceptual (different methods of assessment);
- Praxeological (the practice of conducting assessment); and
- Socio-emotional (the social practice of assessment).

As such, assessment literacy can be understood as all aspects relating to teachers' assessment competence, based on theories of assessment, sound practices, socio-cultural understandings and how these are embedded within the educational context.

The importance of assessment literacy

Assessment literacy is important because it is needed by teachers in their daily practice. Through measuring learning, teachers can:

- Quantify and understand their own impact (Beziat & Coleman, 2015; Pastore & Andrade, 2019)
- Identify learner needs, including the need for extra support or challenge, and to identify when interventions are needed (Pastore & Andrade, 2019; Will et al., 2019), and
- Provide feedback to learners and parents, refine the learning goals that they have for learners and tailor their instruction accordingly (Alkharusi, 2011; Mellati & Khademi, 2018).

Research shows teachers' assessment practices impact learning and achievement. Consequently, over the past two decades, there has been an increasing focus upon developing teachers' capability to engage in high-quality assessment practices (Adie et al., 2020; Bijsterbosch, Béneker, Kuiper, & Schee, 2019; Deneen & Brown, 2016; Looney et al., 2018a; Pastore & Andrade, 2019).

Given the importance of assessment in everyday teaching practice, assessment literacy is crucial for teachers to successfully utilise assessments and make accurate judgements about their practice based on those assessments. The importance of assessment literacy to good teaching practice is reflected in its inclusion in teacher professional standards. Professional standards in five English-speaking countries (Australia, Canada, New Zealand, the United Kingdom and the United States) and countries in mainland Europe include reference to eight key elements of assessment literacy (DeLuca et al., 2016, 7):

- **Assessment purposes** (choosing an appropriate assessment)
- **Assessment processes** (creating, administering, scoring, and interpreting assessments and their results)
- **Communication of assessment results** (giving feedback to learners and sharing results with other stakeholders)
- **Assessment fairness** (considering learner diversity)
- **Assessment ethics** (upholding the rights and privacy of learners and reporting accurately)
- **Measurement theory** (understanding psychometric principles of assessment)
- **Assessment for learning** (using formative assessment), and
- **Assessment education and support for teachers** (continuing professional development in assessment)

The presence of assessment literacy in definitions of teacher professional standards reflects the important role that standardised assessments of learning play – often unfairly – in professional accountability for teachers (DeLuca & Bellara, 2013; Popham, 2011). It also reflects empirical findings that greater levels of assessment literacy amongst teachers is associated with greater academic achievement by learners (Amirian & Behshad, 2016; Mellati & Khademi, 2018). This is particularly the case when learners are themselves engaged in assessment design and facilitation (Deeley & Bovill, 2017). As Wiliam (2011, p. 13) suggests:

> *"… Integrating assessment with instruction may well have unprecedented power to increase learner engagement and to improve learning outcomes."*

References to assessment literacy in IB documentation

Given the importance of assessment literacy to teachers' professional work, it is unsurprising that our review of IB documentation finds multiple references to assessment literacy or assessment operations. It is important to note that the document scan included a representative, rather than a comprehensive, selection of IB documents, and it should be interpreted with this in mind.

Table 2 shows the total count of assessment-related excerpts, organised by programme and subject group. These counts indicate how many instances of text related to assessment literacy or assessment operations are found in the IB documents scanned.

Table 2: Total count of assessment-related excerpts highlighted by IB programme and subject group

	Continuum	PYP	MYP	DP	CP	Total
All subject groups	269	112	504	215	4	1146
Group 1 Lang&Lit		8	4	128		177
Group 2 LangAcq			138	161		299
Group 3 Ind&Soc		6	78	236		320
Group 4 Sciences		26	4	177		245
Group 5 Maths		13	7	241		325
Group 6 Arts		12	5	303		370
Group 7 PSPE-PHE		10	6			75
Group 8 Design			4			49
Assessment		40	86	6	122	308
Cores & capstones	16	6	152	85	5	311
Leadership	12	6				18
Grand Total	**297**	**239**	**1281**	**1606**	**220**	**3643**

The references to assessment within the IB documents scanned is very interesting in terms of the intended assessment purpose. For example, the greatest focus found across IB programmes is that of Internal Assessment (IA) and internal assessment procedures. **Figure 1** below shows the count of excerpt codes with the individual IB programme counts. Other aspects that were mentioned more than 250 times were external assessment procedures, external assessment and marking guidelines. This reflects a strong focus on the formal requirements around assessment, and the assessment responsibilities that fall to IB teachers.

Assessment literacy is the fifth most prominent topic on which guidance is available across all documents. The greatest focus on assessment literacy is found in documents related to the MYP, followed by the PYP, DP and CP. A focus on the teaching-learning-assessment cycle is the fourth most prominent topic on which guidance is found, with this greatest in the DP followed by the MYP, PYP and CP.

Guidance on other topics related to assessment literacy – assessment design, and formative assessment – receive almost 250 references each while there are 50 references to digital assessment. For all of these, most references are in documents related to the MYP.

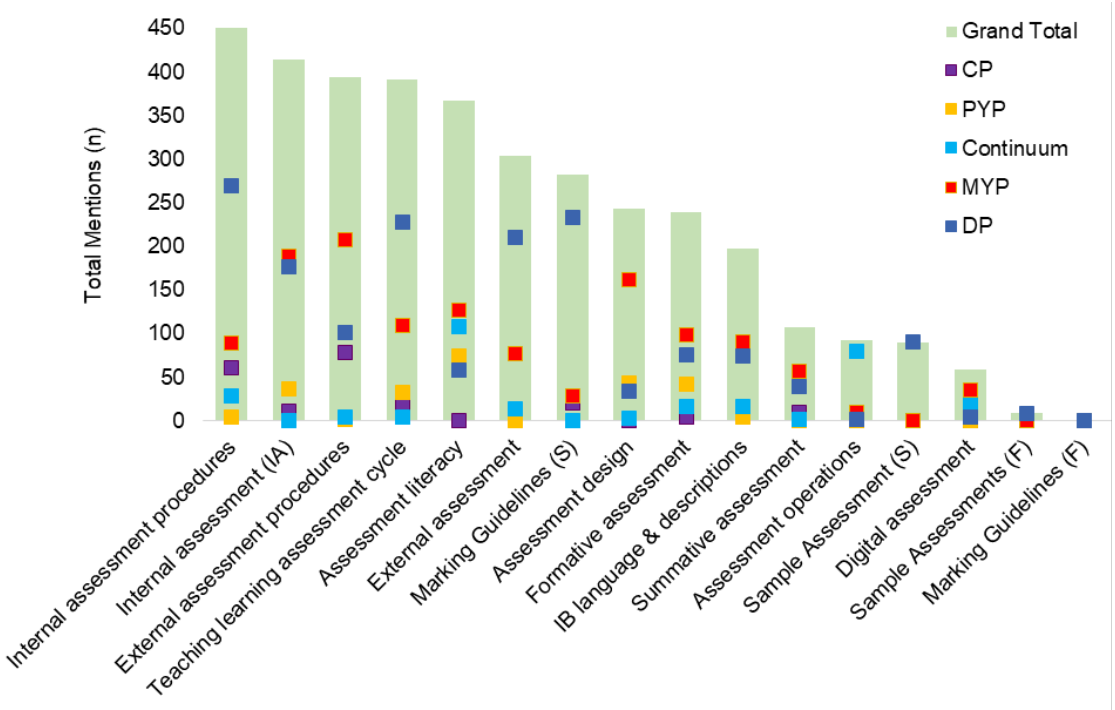


Figure 1: Total instances of assessment-related excerpts, by code and IB programme

Figure 2 shows the representativeness of assessment guidance in IB documents by programme. References to assessment literacy and assessment operations are spread across all IB programmes, with greater emphasis in some programmes than others. There are some assessment types visible here that are clearly only applicable in some contexts (for example, *sample assessment* in the Diploma Programme) whereas others tend to show a more-even spread across programmes (for example, general assessment literacy).

The majority of assessment literacy guidance, as well as guidance towards external assessment procedures, is available in the documents aimed at multiple subject groups. These include the documents at continuum and programme level, such as *Assessment Principles and Practices: Quality Assessments in a Digital Age, or Teaching and Learning Informed by Assessment* in the DP. It is interesting to note the limited amount of emphasis on formative assessment (F) in contrast to summative assessment (S) in relation to both sample assessments and marking guidelines.

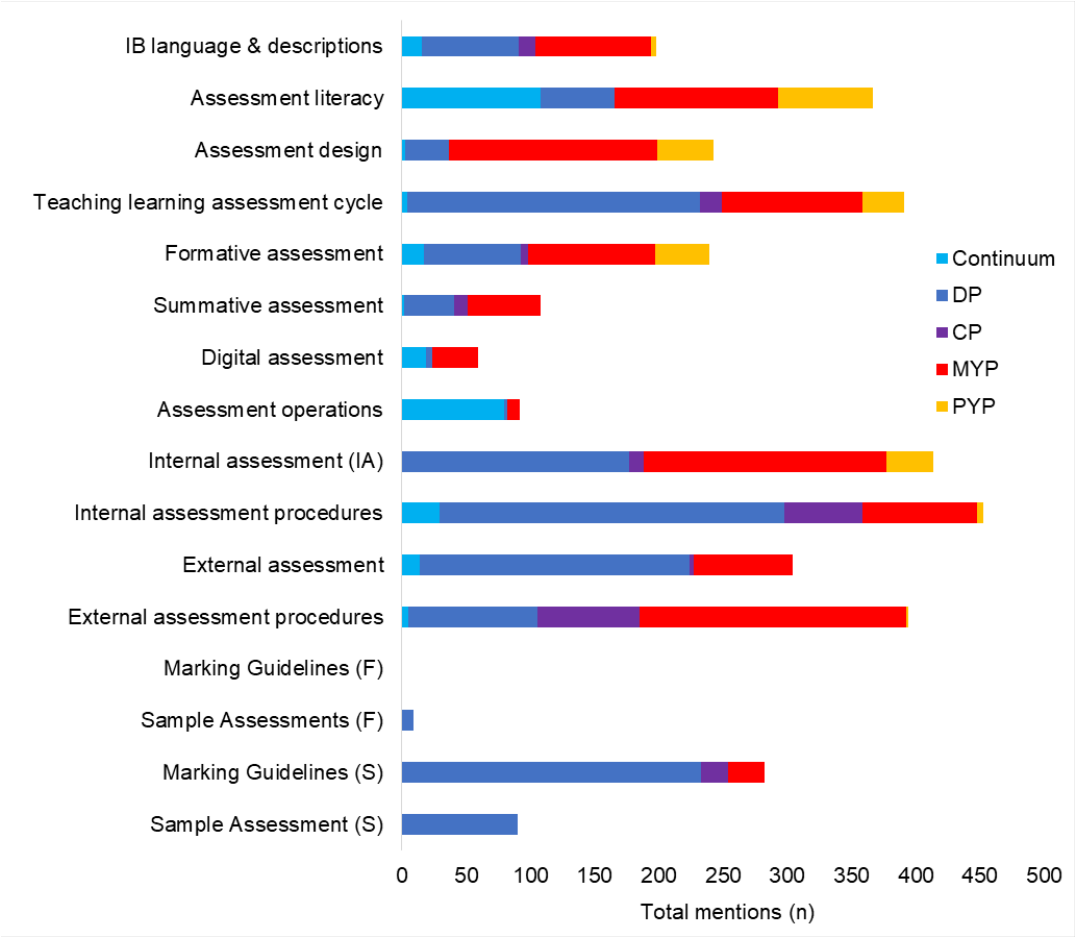


Figure 2: Assessment guidance in IB documents, by programme

More details about the reference to assessment by subject and by specific documents can be found in **Appendices 2 and 3.**

In regard to assessment literacy specifically, **Figure 3** summarises the guidance given in the ten documents in which this is most prominent, including workshop guidance documents (WG). In this analysis, reference to several elements of assessment literacy was included: assessment literacy itself; assessment design; formative assessment; the teaching, learning and assessment cycle; and digital assessment. The degree of reference to each of these themes varied across documents.

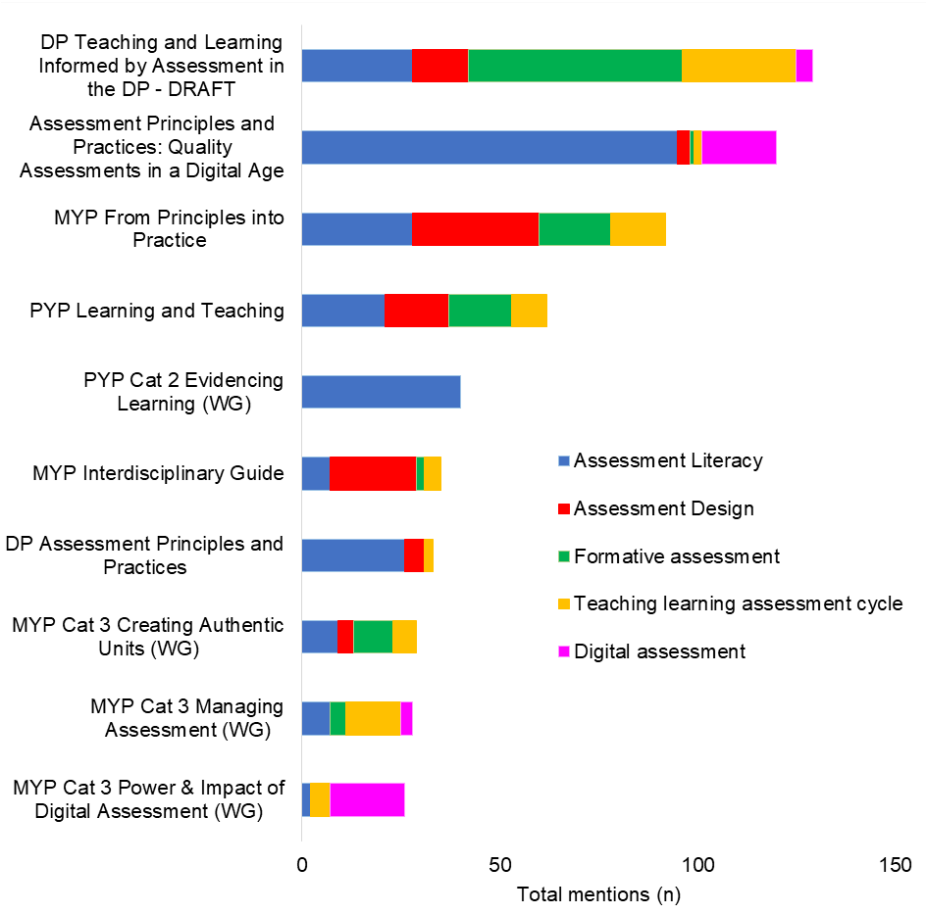


Figure 3: Documents with most guidance in assessment literacy

The guidance around **assessment literacy** itself is greatest in the document '*Assessment Principles and Practices: Quality Assessments in a Digital Age*'. References to assessment literacy are also found in PYP and MYP programme documents and in PYP and MYP workshop guidance documents.

Guidance around **assessment design** is particularly found in MYP documentation, most notably in *MYP: From Principles into Practice*. It is also referred to in two DP related documents and one PYP document.

The greatest guidance around **formative assessment** is found in the Diploma Programme document '*Teaching and Learning Informed by Assessment'*. At the time of the review this document was in the final stages of drafting and was not yet public. Formative assessment is also referred to in PYP and MYP programme documents but to a lesser extent.

The **teaching, learning and assessment cycle** receives most attention in the new document *Teaching and Learning Informed by Assessment in the DP*, and is also

referred to across a range of PYP, MYP and DP documents.

Digital assessment is – inevitably – most referred to in the document that explicitly focuses on digital assessment. It is also mentioned in some MYP workshop guidance documents.

Insights from the document review

Analysis of the document review data shows that guidance towards assessment literacy and design competence are spread across all IB programmes, though clearly with more emphasis in some programme documents than others. Importantly, it was found that most guidance towards assessment literacy was evident at the continuum- and programme-level documents.

This has significant implications for teachers who only use subject-level documents (for example, subject guides and teacher support material), given that the assessment guidance in these documents is largely operational or procedural. Additionally, the documents that contain the most guidance with respect to assessment literacy and design tend to be very new (since 2018 or not yet published), meaning that many teachers may not have had the chance to read or use the guidance as yet.

Where teachers access IB documents and services that are spread across the various audience levels – continuum, programme, subject, TSM (teacher support materials) and workshop – they are more likely to receive an understanding of IB expectations towards assessment literacy and design competence and potentially the professional skills associated with these understandings. It must be noted, however, that this capacity is often restricted to more-experienced IB teachers, given the time needed to read and digest the various documents and subsequently implement the guidance therein.

Teacher profiles

To illustrate the potential teacher experience of IB information and messaging around assessment literacy, a selection of teacher profiles can be found throughout this report. These hypothetical profiles have been designed to include the IB documents and experiences that IB teachers would reasonably be familiar with after a moderate amount of time (e.g., 3-5 years) teaching in the programme(s).

These profiles also assume a reasonable level of teacher engagement with and commitment to the IB programme(s), with adequate support provided from their school in terms of professional learning time and resources.

Assessment Knowledge and Skills

Evolving skills and knowledge in assessment

While the knowledge, skills and attitudes incorporated in definitions of assessment literacy are influenced by changes in attitudes towards education and assessment over time, they are equally influenced by teacher career development. Novice teachers tend to focus on summative assessments, on technical knowledge about assessment and on describing and justifying their assessment practices (Birenbaum et al., 2015b; DeLuca et al., 2018; Rønsen & Smith, 2014; Xu & He, 2019a; Xu, 2017). As teachers become more experienced, their focus shifts to formative assessment, equity, reflection and critiquing their assessment practices.

Masters (2013) states that there are three developments that have brought about a change in the way that we view assessments and learning:

1. **New thinking** – this relates to how assessments monitor learning (what learners know and can do) and how assessment can support learning. New thinking in assessment:
    a. Gives all learners a chance to demonstrate their learning successfully
    b. Is integral to the teaching-learning cycle
    c. Informs and monitors learning gains,
    d. Is designed keeping in mind teachers, learners, and curriculum outcomes, and
    e. Has strong validity and reliability and strong inter-rater reliability.
2. **New metrics** – this refers to the testing of knowledge, skills and attitudes usually not captured in traditional or orthodox assessment formats.
3. **New technologies** – this refers to intelligent forms of testing which allows for differentiated assessments to match differentiated teaching. This could include real-time measurement of learner's learning and a reduction in the time for testing to generate results and feedback. All assessment information would provide a continuous stream of feedback to teachers and learners.

Foundational skills and knowledge

The foundation of assessment literacy is the ability to use, evaluate and interpret the assessments used to produce the data (Barone, 2012). The important part of this literacy is to ensure a teacher's understanding of the key areas of the assessment process, i.e., the selection or development of methods to be used for monitoring student progress in

relevant subjects, administrating assessments in efficient way, and analysis and interpretation of the results, including grading (Mertler, 2009).

Despite the importance of assessment, many teachers struggle to develop and administer assessments, and to interpret the results of different types of assessment. In other words, the literature has revealed that teachers have difficulties in test development, administration, and interpretation (Mellati & Khademi, 2018). They need to develop skills in developing authentic assessments that are based on the classroom learning objectives.

According to Brookhart (2011), the following are some of the educational assessment knowledge and skills that are necessary for teachers:

- They should understand learning in the content area they teach
- They should have the skills to administer and analyse questions, test items and performance assessment tasks to ascertain that specific knowledge and thinking skills required for students to do them, and
- They should be able to construct scoring rubrics that quantify student performance on classroom assessments into useful information for decisions about students, classrooms, schools, and districts.

Enabling teachers to design and score quality assessments is often regarded as essential. Bijsterbosch et al. (2019) developed a professional development programme to move teachers away from assessment based on rote learning and towards assessment that encourages active and meaningful learning. They measured meaningful learning as occurring where questions in assessment tasks asked for 'understanding, applying, evaluating or creating', drawing on Bloom's taxonomy.

Black (2011) identified five steps to improve assessment tasks and enhance the dependability of results. These are:

1. In **task design**, by allowing learners to apply the skills they are learning
2. In **implementation** in the classroom, by clarifying with other teachers on how much help is to be given to learners
3. Having a **portfolio** of assessments to give learners multiple chances to be assessed
4. Being **consistent** in interpreting the marking criteria with marking and aggregation, and
5. Using a **standardisation** or moderation approach to collaborate with other teachers.

Koh et al. (2018) examined the task design aspect of assessment literacy over two years of a professional development programme in authentic assessment. They found that assessments were enhanced by a focus on higher-order thinking, problem-solving, communication and creativity, replicating more authentic challenges in the real world rather than drawing on the recitation of rote learning.

A focus on having teachers develop assessment tools often underestimates the technical difficulty involved, however. Assessment practices such as test construction can be complex and confusing, even for those who have the requisite skills (Scott et al., 2011; Al-Malki & Weir, 2014). Some studies suggest that teachers can produce assessment tools and rubrics of average quality. They are not always indicative of best practice, however, nor do they always have connections between instruction and assessment (Maclellan, 2004).

In relation to summative assessment, it is certainly possible to provide training in traditional assessment skills such as item writing and the development of rubrics. More frequently, however, schools utilise off-the-shelf assessment products that have been designed by assessment experts.

Understanding validity and reliability

Whether they design assessment tools themselves or use those prepared by others, there is a need to ensure that teachers understand validity and reliability of assessment (Gotch, 2012).

Assessment reliability for teacher-designed assessments is known to be an area of challenge (Harlen, 2005; Johnson, 2013). Teacher judgement is known to be influenced by a myriad of factors from learner characteristics to effort, as is their interpretation of level descriptions. A lack of support, non-uniform construct perceptions among teachers and a lack of clarity in assessment criteria add to the lack of reliability (Johnson, 2013). While these can be somewhat overcome by moderation, studies of teacher moderation do not show high levels of inter-rater reliability (Wyatt-Smith et al., 2010). Moreover, the practicality of moderation is limited other than in major summative examinations.

Assessment validity is a key component of ensuring that assessments are meaningful and provide useful information about student achievement. Test design should be based on required thinking skills, that goes beyond the knowledge of various taxonomies (e.g., Bloom, Webb), but rather focuses on

understanding how different test items and performance tasks in a particular content area require different thinking skills.

The quality underlying an assessment tool is an important issue, meaning that the tool should accurately assess a student's ability, rather than be focused on the particular score that the student achieves. This construct validity (Lissitz & Samuelson, 2007) is the basis of formal accountability with its psychometric indicators and applicability to any testing environment or population.

More recently, however, validity theories have evolved from the reliance on psychometric analysis, to a social constructivist theory that proposes that validity in assessments is a function of teacher interpretation and related inferences about instruction and student learning (Kane, 2006; Moss, Girard, & Haniford, 2006). Many teachers may either not understand validity however, or – if they do – may not implement assessment in line with this (Black et al., 2010).

The strength of validity comes from a well-constructed theoretical framework, grounded in relevant evidence (Barone, 2012). In relation to summative assessment, achieving validity and reliability requires (Harlen, 2005, 263):

- "Decisions about the domain of knowledge, skills and other attributes of learning to be assessed that are justified in terms of how learning takes place
- A valid sample of student behaviour in the domain
- Criteria for judging the sample that are well matched to the goals of the work, of the curriculum and of the domain
- Procedures for the reliable and unbiased application of the criteria, and
- Procedures for reporting and communicating with users of the assessment outcomes".

Achieving the combination of these is asking a lot of teachers if they are developing assessment tools themselves, but this does provide a useful lens with which teachers can evaluate commercial assessment tools.

Developing rubrics

A rubric can be defined as a type of matrix that provides scaled levels of achievement (e.g., standardised grades) or understanding (criteria) based on a given type of performance (a paper, an oral presentation, a skill presentation). The descriptions of the possible levels of attainment for each of the criteria should be clearly presented to make them useful for judgment of, or reflection on, progress

toward valued objectives (Huba and Freed, 2000).

Rubrics aid teachers in achieving higher levels of consistency when scoring performance tasks and promote teaching and learning by making assessment expectations explicit and aiding the feedback process (Jönsson & Panadero, 2017). If rubrics are created and used correctly, they are strong tools that support and enhance classroom instruction and student learning. (Brookhart, 2013).

The two most common distinct types of rubrics are analytic and holistic. The choice of type will reflect approaches to constructing them: by outlining discrete steps to follow one by one (Bresciani et al., 2004; Mertler, 2001), or by building rubrics from the perspective of describing its essential features (Huba and Freed, 2000; Arter and McTighe, 2001). Knowing when to use each type of rubric appropriately is an important part of assessment literacy.

Brookhart (2013) proposes that two essential components of effective rubrics are:

- Criteria that relate to the learning (not the "tasks") that students are being asked to demonstrate, and
- Clear descriptions of performance across a continuum of quality.

Rubrics can be a powerful tool to objectively measure the quality of performance in open-ended tasks. Analytic rubrics, with multiple categories and descriptions reflecting various levels of performance, can help teacher evaluate the effectiveness of instruction, document evidence of learner progress, and give feedback to learners. To construct well-designed rubrics, Vercellotti & McCormick (2021) suggest the following steps:

- Establishing categories,
- Describing levels of performance,
- Reviewing the components of the rubric before implementation, and
- Evaluating the effectiveness of the rubric after implementation.

Research indicates that the reliable scoring of performance assessments can be enhanced by the use of rubrics, especially if rubrics are analytic, topic-specific, and complemented with exemplars. Rubrics alone, however, cannot provide full valid judgment of performance. A combination of rubrics that make expectations and criteria explicit can, however, facilitate feedback and self-assessment leading to a more well-rounded judgement (Carlington, 2007).

Interpreting assessment data

Even if teachers do not design tools themselves, for example, if they use IB

assessment rubrics as published, they should still be able to interpret assessment results. This means being able to identify key findings in assessment data and to use these to inform their practice. Teachers need to know how to use appropriate approaches to data analysis to avoid generating invalid insights from the data, and to be able to make sense of data, namely, to transform information into a comprehensible interpretation that drives action (Weick et al., 2005).

Some identified challenges include that teachers may use data to reinforce their own judgement about learner performance, to evaluate their teaching practices and to sub-divide learners into cohorts of like-achievement (Choi et al., 2021). Their interpretation is often rather superficial, however, with measures of central tendency preferred, instead of teachers disaggregating data to identify patterns closely (Hoover & Abrams, 2013). Moreover, teachers may develop strategies for interpreting data that may not coincide with the ways in which outputs were designed (Farley-Ripple et al., 2021).

To enhance teachers' use of data in informing teaching strategies, a step-by-step method of professional learning is suggested, including professional experiences in the classroom (Kennedy-Clark et al., 2021). This reflects the notion that the level of sophistication in assessment is expected to increase with teacher experience.

A newly-qualified teacher would be expected to only have a basic understanding of different assessment strategies, including those that are formative and summative (AITSL, 2011). In contrast, a leading teacher should be able to evaluate the policies towards assessment used by the school and be able to support colleagues to use a range of assessment strategies and use data to diagnose learning needs.

Data-informed decision making is considered important for school improvement. The case study of data use in five countries (United Kingdom, Germany, Poland, Lithuania and the Netherlands) show that schools use data for school development, accountability, and instructional improvement. The schools, however, struggle with similar types of problems: e.g., lack of access to high quality data, lack of professional development in using data, and a lack of collaboration around the use of data (Schildkamp et al., 2019).

Downey & Kelly (2013) found that the frequency of training in data use appears to be positively linked to teachers' self-reported level of understanding of data. Their research suggests that teachers with no formal

leadership roles require regular training to significantly improve their understanding of data. Teachers strongly feel that data analysis and interpretation should be delegated to a greater extent throughout the staff cohort in a school, instead of just being conducted by more senior members of the school leadership team.

Elements of the framework

Based on the literature reviews in this section, and the teaching experience of the researchers undertaking this project, the elements of the Assessment Literacy and Design Competence Framework shown in **Table** 3 were assembled.

Table 3: Framework components – Assessment Knowledge and Skills

Category	Objective
Evaluating Assessment Items	IB teachers have the skills and knowledge to evaluate the extent to which assessment items can generate reliable and valid data.
Developing and Using Grading Rubrics	IB teachers can develop grading rubrics for open response tasks that enable fairness and transparency.
Analysis of Assessment Data	Assessment data is routinely used by teachers to monitor learner progress and to identify the need for strategies to enhance learning.
Informing Teaching Practices	IB teachers actively draw on assessment results to inform their own teaching practices.

Teacher Profile 1: DP Mathematics Teacher

This profile is that of a teacher who teaches mathematics in the IB Diploma Programme, with no additional leadership responsibilities. As part of their role, the teacher reads and uses the following documents:

Document Name	Document Type
Assessment Principles and Practices: Quality Assessments in a Digital Age	Continuum document
DP From Principles Into Practice	Programme documents
DP Assessment Principles and Practices	
Teaching and Learning Informed by Assessment in the DP	
DP Grade Descriptors	
DP Mathematics: Analysis and Approaches Guide	Subject guides
DP Mathematics: Applications and Interpretations Guide	
DP Mathematics: Analysis and Approaches TSM	Subject teacher support materials (TSM)
DP Mathematics: Applications and Interpretations TSM	
DP Mathematics: Analysis and Approaches Assessed Student Work	
DP Sample Unit Planner TSM	

In addition, this teacher has attended two IB workshops: Category 1 and Category 2 DP mathematics (analysis and approaches).

The profile shown in **Figure 4** illustrates the potential access to assessment literacy and practice information for this hypothetical mathematics teacher in the Diploma Programme. In the context of this DP mathematics teacher, guidance towards assessment literacy is concentrated in the continuum- and programme-wide documents, with little assessment literacy guidance at the subject or TSM levels.

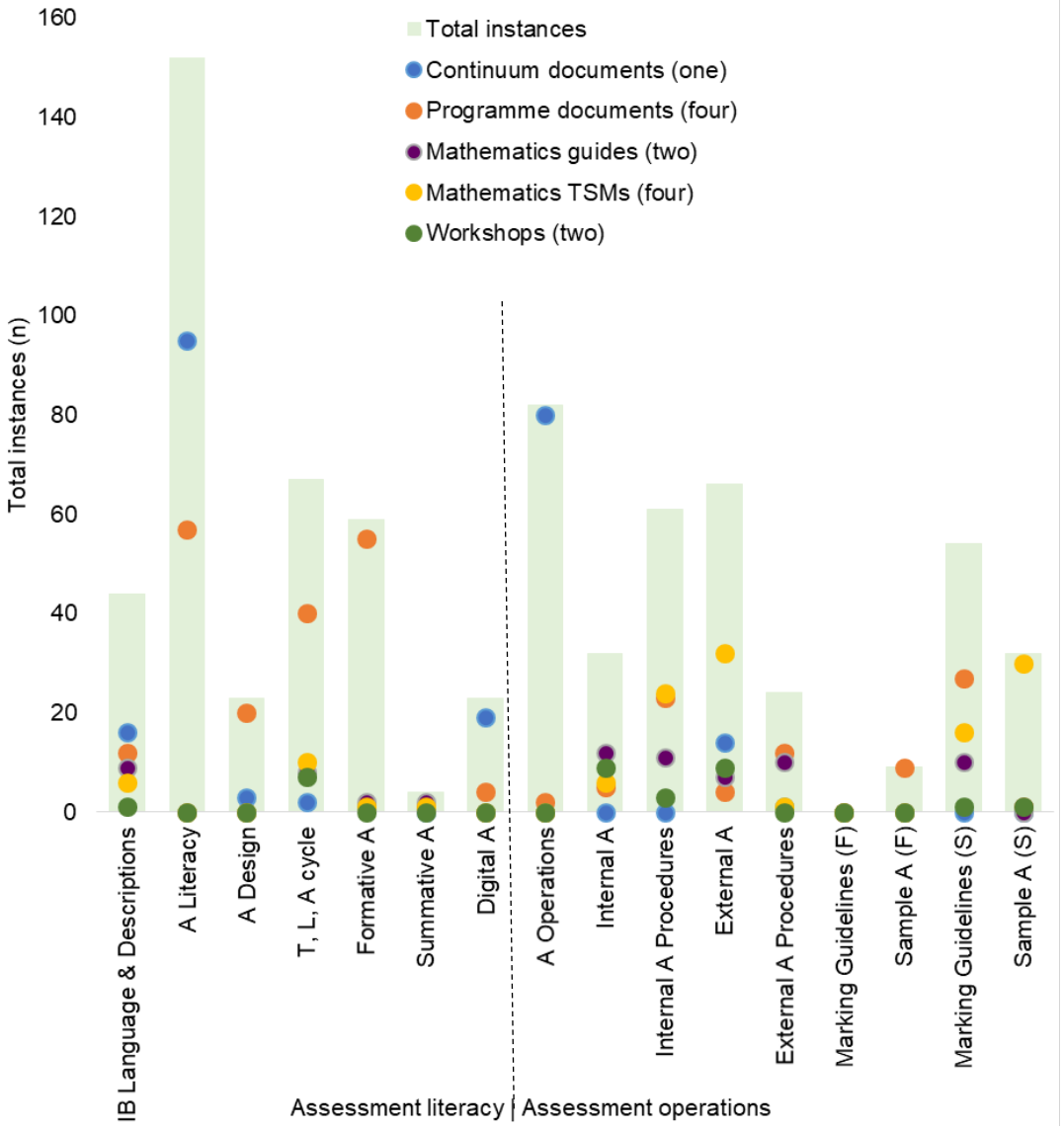


Figure 4: Profile of a Diploma Programme mathematics teacher

Practical assessment implementation procedures tend to be concentrated more in the subject guides and teacher support materials. The DP mathematics workshops appear to concentrate more on practical assessment procedures.

Formative Assessment

Formative versus summative assessment

When assessment is discussed, much of the focus tends to fall on summative, formal examinations. These are, of course, important but in reality, the majority of teachers' assessment practices are formative, less-formal practices. Indeed, the concepts of formative assessment and assessment for learning have come to be regarded as key elements of good teaching (Wiliam, 2011).

Until as recently as 2010, formal requirements for teachers assessment literacy focused primarily on summative assessment (Brookhart, 2011). The "*standard-based reform movement*" (Carnoy & Loeb, 2002: 5) emphasised that teachers were accountable for how they evaluated learner achievement. The more recent shift to a focus on formative assessment requires teachers to self-monitor and adjust their practices to better meet learner needs (Lysaght & O'Leary, 2013).

This places emphasis on innovation and flexibility, and on what teachers need in order to best implement the tenets of formative assessment in their practices. While some formative practices such as sharing learning intentions and success criteria with learners may be more common, others such as the use of self and peer assessment appear to be less common (Lysaght & O'Leary, 2013).

As Heritage (2009, 5) suggests, there is a move away from assessment as a focus on accountability and certification towards assessment as informing future directions in teaching and learning, which he refers to as 'present to future models'. Hence, it is relevant for formative assessment to make up a significant component of teachers' assessment literacy.

Traditionally, formative and summative assessment have been considered to be mutually exclusive. It is important to note, however, that contemporary approaches to assessment are moving away from these distinctions (Masters, 2013), reflecting the understanding that assessment often has multiple, simultaneous purposes and involves multiple stakeholders (Klenowski & Wyatt-Smith, 2014; Newton, 2007). Masters (2013, 6-7) proposes:

> *'… a simple unifying principle; namely, that the fundamental purpose of assessment is to establish where learners are in their learning at the time of assessment'.*

Formative assessment principles

The benefits of carrying out formative assessment are two-fold – teachers become better prepared to respond to complex needs of different learners

and learn to differentiate instruction (Shirley & Irving, 2015); learners develop their metacognitive skills and start taking responsibility for their own learning (Organisation for Economic Co-operation and Development, 2015).

In a seminal article, Black & Wiliam (1998) expound the principles of formative assessment. These include that it actively promotes learning through adjustments in instruction by teachers, and proactive monitoring of progress by learners. Moss & Brookhart (2009) list six elements of formative assessment. Four more are added by Cizek (2010):

1. Shared learning targets and criteria for success
2. Feedback that feeds forward
3. Learner goal setting
4. Learner self-assessment
5. Strategic teacher questioning, and
6. Learner engagement in asking effective questions.

7. Evaluate learner's current knowledge
8. Plan to reach the final learning goals
9. Specify success criteria, and
10. Provide neutral and non-judgemental feedback to learners.

Formative assessment means establishing clarity and consensus on learning goals, investigating and analysing evidence of learning relative to the set goals, providing feedback, and taking action to close any gap between learners' current learning levels and the desired goals (Herman et al., 2015). In simple terms this includes the questions:

- Where am I in my learning?
- Where do I want/need to be?
- How will I get there?

Formative assessment is low stakes and is carried out in the classroom with teachers and learners as partners in the assessment process. The purpose of formative assessment is to capture learner thought while they approach an assessment task as well as to provide teachers feedback about their teaching (Davis, 2015).

When using formative assessment strategies, teachers engage learners in instructional tasks that allow the teacher to uncover levels of learner understanding so that the teacher may change instruction accordingly (Shirley & Irving, 2015). While formative assessment can be enhanced through the use of digital technologies, this can only happen if teachers first have a good grasp of the key elements involved in effective formative assessment.

Key considerations in formative assessment

Beyond the key elements of formative assessment identified above, a review of literature highlights some key considerations for teachers to follow in implementing formative assessment (Andrade et al., 2019; Bhagat & Spector, 2017; Black, 2015; Herman et al., 2015; Moss & Brookhart, 2009; Organisation for Economic Co-operation and Development, 2015; Purkayastha et al., 2019; Shirley & Irving, 2015; Yan & Cheng, 2015):

- Formative assessment should be **frequent**, and can be formal and structured or informal and interactive.
- There should be an **active classroom culture** focussed on using formative assessment tools and processes. Teachers need to emphasize that learners should focus on mastering tasks and concepts rather than on getting fixed grades or outdoing their peers. Learners should realise that they need to take responsibility for their own learning.
- Learners need to possess **metacognitive and emotional competencies** that gives them self-awareness, an ability to self-reflect and the skills to critically evaluate different sources of information. These skills in turn impact learner's self-esteem, motivation and engagement in the learning process, helping them 'learn how to learn' and giving them confidence as self and peer assessors.
- **Clear and specific learning goals** should be shared with learners. Teachers should link these learning goals to the real world as much as possible.
- Teachers must **gauge learners' current knowledge levels** so that they can make plans which will help learners reach their desired learning levels.
- Teachers should utilise a variety of **instruction techniques** and differentiated approaches to instruction to ensure that learning goals are met.
- A **variety of assessment tasks** must be undertaken to assess learning to meet diverse learning needs.
- **Future-focussed feedback,** with the sole purpose of improving learning, should be provided to learners.
- **Formative assessment tasks** should be designed with the view that learners need to be engaged and involved in the process. Success criteria need to be shared with learners.
- Learners must be encouraged to **self and peer-assess** using the success criteria. Discussion of

samples of learner work will help learners to fully understand the success criteria and to reflect on their own performance.

Despite the benefits of formative assessment, it tends to be inconsistently implemented. Structurally, this is because it requires decentralization of decision-making powers to, and hence empowerment of, teachers. It is also due to misunderstandings of assessment among teachers, particularly in relation to how summative and formative assessments can work (Birenbaum et al., 2015a; Organisation for Economic Co-operation and Development, 2015).

While great strides have been made in the field of how assessment can improve learning, teachers often face issues regarding how best to integrate assessment into learning. As Black & Wiliam (2010) state, formative assessment must keep in mind theories of active learning. It also needs to be underpinned by an understanding of growth mindsets Dweck (2006). This assumes that learner abilities are not fixed but can be enhanced through effort, and by designing and engaging learners in appropriate learning tasks (Masters, 2013).

A common mistake among teachers is to set tasks for learners that assume that they are all performing at an 'average' standard (Goss et al., 2015). As Masters (2013: 34) noted:

> *"Despite the evidence that learners of the same age are at very different points in their learning, much teaching is focused on delivering the same year level curriculum to all learners in a class".*

This reinforces the need for ongoing formative assessment, to ensure that teaching is targeted to the skills and knowledge of individual learners at a particular point in time. As Goss et al. (2015) suggest, targeted teaching involves using strategies such as formative assessment and providing learners with future-focussed feedback. The reality of multiple different levels within any one class also indicates that formative assessment activities themselves need to be differentiated to a range of abilities.

An underlying assumption of formative assessment is that teachers (and learners themselves) can interpret the data that they collect both to draw inferences about learning and also to plan for subsequent teaching and learning activities. Research, however, has found that both teachers and learners find the second of these tasks – planning - challenging (Goss et al., 2015; Heritage et al., 2009).

Goss et al. (2015) recommend the following four-step model for integrating assessment into the teaching-learning cycle:

- **Assess** – Identify what learners already know and can do and agree learning goals
- **Teach** – Target teaching to meet learning needs of each learner, using frequent formative assessment to refine teaching approaches
- **Track** – Use ongoing monitoring of all learners to identify progress against learning goals and target support to learners who most need it, and
- **Adapt** – Continue practices that yield positive learning outcomes and revise those that do not.

Questioning as formative assessment

As part of usual classroom practice and as one of the elements of formative assessment, teachers may employ a variety of questioning styles. Questioning serves several purposes:

- Helps students engage in the learning process
- Provides opportunities for students to ask questions themselves, and
- Challenges levels of thinking and informs whether students are ready to progress with their learning.

In particular, questions that probe for deeper meaning and require some manipulation of information can foster critical thinking skills and higher-order capabilities such as problem solving, thus encouraging the types of learners that will flourish in the 21st century (Doherty, 2017; Kyriacou, 2009; Paramore, 2017). Effective questioning includes (Kyriacou, 2009):

- Quality (questions should be clear and relevant to the content)
- Targeting (matching them to the right student, and including as many students as possible)
- Interacting (using a variety of techniques to encourage two-way communication)
- Feedback (offering praise and encouragement, and ensuring students feel respected and valued), and
- Extending students' thinking (expanding the dialogue with follow up questions to promote co-construction of knowledge).

Ensuring inclusion in formative assessment

Research shows that, despite efforts to enhance new teachers' skills and knowledge of diverse classrooms, coursework on topics related to diversity are typically secondary to core curriculum and educational studies courses (Ball & Tyson, 2011). These topics include, for example,

multicultural and antiracism education, social justice, learning through a second language, and special education.

Few studies examine teacher candidates' ability to address these multiple aspects of classroom diversity simultaneously, let alone a teacher's ability to integrated assessment with these aspects (DeLuca & Lam, 2014). Yet in order to ensure assessment fairness, teachers need to provide assessment conditions in their classrooms that are sensitive to student diversity and exceptional learners (DeLuca et al, 2016).

Assessments need to offer maximum adaptability and flexibility, to meet the need of a diverse student base. There are some key aspects to ensuring that assessment approaches remain adaptable and applicable to all students, and these include applying expertise to:

- Item content and format (using assessment frameworks that are properly targeted in terms of content and format);
- Accessibility (taking accessibility into account when designing assessments);
- Information and support for students (making sure all students are informed and prepared for assessments);
- Reasonable adjustment (ensuring changes are made to the school environment to reduce any potential disadvantage experienced by those with a disability); and
- Mode of delivery (paper, verbal, online).

The assessment of transversal skills

Since effective teaching depends on ensuring an alignment between teaching and assessment practices, it is important that teachers' assessment practices and schools' assessment policies reflect the diverse student population. Schools have a crucial role to play in ensuring that their assessment policy supports effective teaching, while also responding to the challenges of diversity (Ysenbaert et al, 2020).

When grouping skills based on their characteristics or their functions, the two most popular groupings are hard skills and soft skills. Hard skills are perceived as specific, teachable abilities that can be defined and measured; whilst, in contrast, soft skills are more personality-oriented interpersonal skills and harder to quantify (Nguyen, 2019). According to this definition, transversal skills belong to the soft skills group. They are also often referred to as 21st century skills, key competences, digital skills, key skills, transferable skills, transversal

attributes, along with the use of other terms.

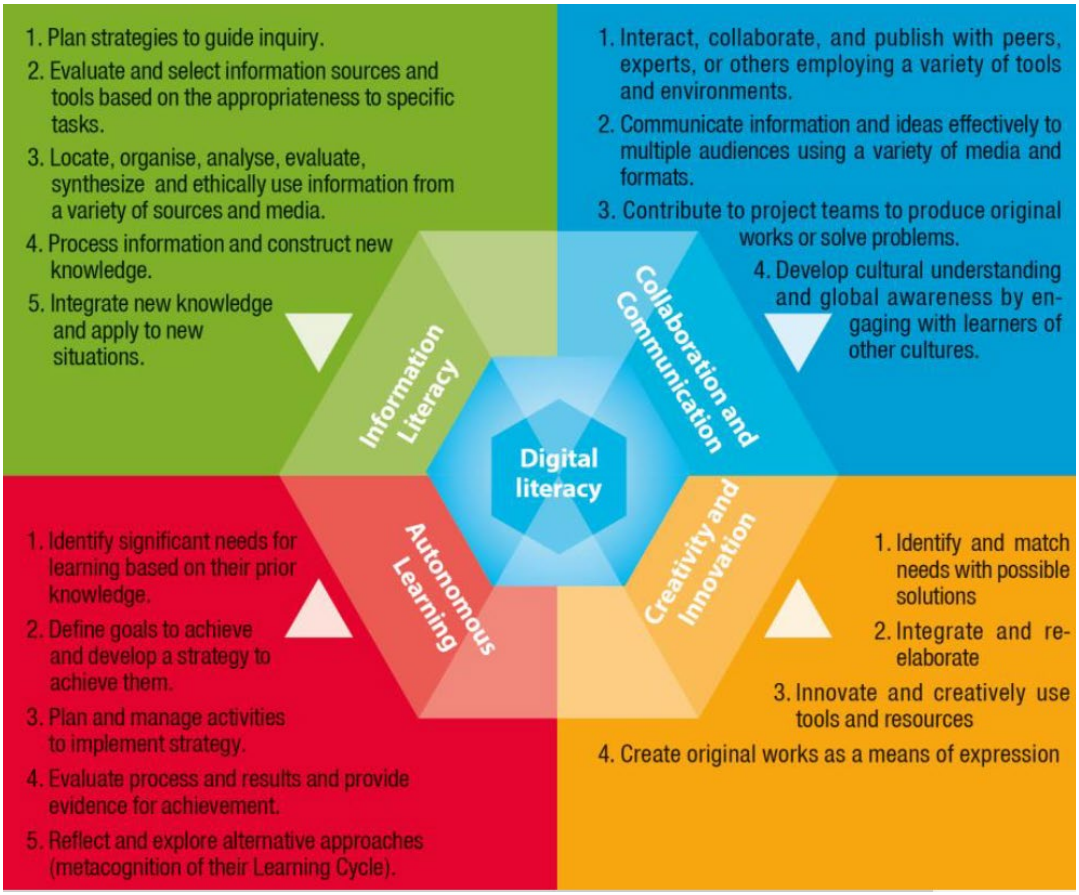
Research indicates that transversal skills could help bridge the gap and solve skill mismatches between students' skills and their future employability. Even though these skills are still poorly assessed in education, they are related skills that can be used in a wide variety of situations and education and work settings (UNEVOC 2018). As these skills, knowledge and competencies are relevant to a broad range of occupations and sectors, they are highly valued by employers (European Commission 2016).

Nguyen (2019) identifies six transversal skills that graduate students lack even though employers demand them. These are technological literacy; social skills; collaboration; self-initiative; creativity; and critical thinking. It is important for education to prepare students for the new world in which, for example, factual recall may not be as important as their ability to problem-solve, or skills are needed that allow flexibility for their unpredictable future (Wrahatnolo & Munoto, 2018).

If these skills are to be prioritised as an educational goal, then teaching them should start at early years by focusing on the basic foundational skills as well as their practical application (Kenworthy & Kielstra, 2015). Integrating these skills into general teaching and learning is a mammoth task. After an extensive review of existing frameworks of Transversal Skills, the ATS2020 Transversal Skills Framework (**Figure 5)** was developed that includes five broad competence areas, with several specific skills in each competence (Economou, 2014).

This framework is a good example of how having a skills framework can form the base for developing assessment tools and tasks for learners to engage in developing these crucial skills. Ideally, they are best assessed formatively which enables insights gained from assessment to inform next steps in development.

Figure 5: ATS2020 competence areas of transversal skills



Elements of the framework

Based on the literature review in this section, and the teaching experience of the researchers undertaking this project, the elements of the Assessment Literacy and Design Competence Framework shown in

Table 4 were identified.

Table 4: Framework Components – Formative Assessment

Category	Objective
Assessment Philosophies	IB teachers are aware of the philosophies that underscore different approaches to assessment and how these have (and continue to) evolve over time.
Selecting Assessment to Meet Goals	IB teachers can select the objective for a particular assessment practice and to determine which tools are appropriate to meet that objective.
Range of Assessment Activities	IB teachers can design and implement a range of assessment activities to meet assessment objectives.
Accommodating Learner Diversity	IB teachers are aware of the need to utilise a range of assessment activities to suit the diversity of learner needs and preferences.
Selecting Assessment Types	Teachers are aware of the importance of selecting assessment types to meet defined assessment objectives.
Pitching Assessment Tasks	IB teachers can target assessment tools in order to suit the spread of learner abilities in a cohort
Assessing Transversal Skills	IB teachers' assessment activities call on learners to demonstrate not only skills and knowledge in curricula areas but also attributes in the IB Learner Profile.

Teacher Profile 2: MYP Teacher

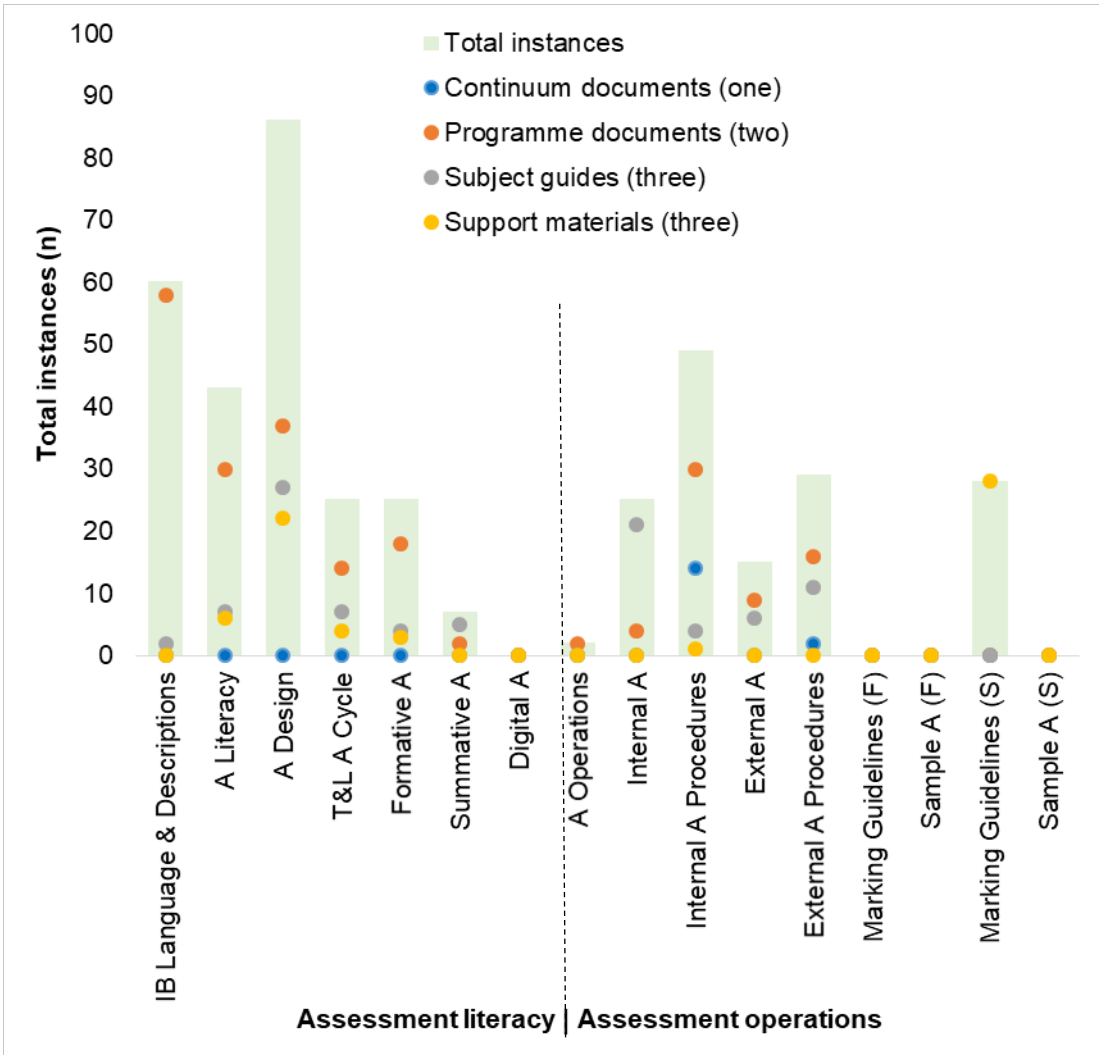
This profile is that of a first-year IB teacher who teaches history and geography in the IB Middle Years Programme, with no additional leadership responsibilities. The school they are in does *not* participate in external e-Assessments, though they do use past exams for professional development. As part of their role, the teacher has been given the following documents, which they read and use:

Document Name	**Document Type**
IB Programme Standards and Practices	Continuum document
MYP From Principles Into Practice	Programme documents
MYP Further guidance for developing MYP assessed curriculum	
MYP Individuals and Societies Guide	Subject guides
Further Guidance for MYP Individuals and Societies	
Fostering Interdisciplinary Teaching and Learning in the MYP	
MYP Individuals and Societies TSM	Subject teacher support materials (TSM)
MYP Individuals and Societies exam markscheme and sample tasks	
MYP interdisciplinary unit evaluation	

This teacher has not attended any IB workshops yet.

The profile shown in **Figure 6** illustrates the potential access to assessment literacy and practice information for this hypothetical Individuals and Societies teacher in the Middle Years Programme. In the context of this MYP teacher, guidance towards assessment literacy is most evident in the programme-wide documents, with some assessment literacy guidance at the subject or TSM levels. Practical assessment implementation procedures tend to be dispersed across the subject guides and teacher support materials.

Figure 6: Profile of a new Middle Years Programme individuals and societies teacher



Teacher Assessment Identity

Multiple dimensions of assessment literacy

Assessment literacy is often regarded as something that relates to skills and knowledge alone. Instead, it is a multi-dimensional construct which needs to take account of the range of dynamics and contexts in which assessment takes place. This includes affective elements that shape the role of teachers in assessment (DeLuca et al., 2019). Affective elements mediate the application of the knowledge and skills achieved by teachers through personal development in directions that pre-defined formulas cannot predict.

Teachers' feelings, emotions, values and beliefs about assessment derive from their own personal experiences, both in the past and in the present. The context in which teachers work – country, region, school, programme level – exerts a strong influence on these affective dimensions. It is important to recognise these often-intangible elements as they are a prism through which assessment knowledge and skills are applied, leading to assessment being termed "*a differential and situated professional competency*" (DeLuca et al., 2019: 1).

The concept of '*teacher assessment identity*' therefore incorporates skills, knowledge and affective dimensions (Looney et al., 2018a). It includes teachers' self-efficacy, and is an important element in determining the effectiveness of assessment practices (Deneen & Brown, 2016). There remains, however, a debate about which comes first – do teachers who are knowledgeable about assessment have more positive feelings towards it, or do teachers with a more positive orientation towards assessment tend to exhibit better skills and knowledge of it (Quilter & Gallini, 2000)?

More recent research suggests that attitudes and self-efficacy are significant predictors of teachers' intentions to conduct formative assessment (Yan & Cheng, 2015). Teachers' positive conceptions about assessment playing a role in enhancing learning influence beneficial assessment practices (Deneen & Brown, 2016). This does not mean, however, that all positively-oriented teachers are able to implement assessment well (Alkharusi et al., 2012). A range of factors, including teaching loads and administrative responsibilities, limit the ability of teachers who emphasise the importance of assessment to enact assessment practices that align with their beliefs (Lyon, 2011).

Conversely, teachers who regard assessment as detrimental to learners may subvert assessment practices, even if they have the requisite skills and knowledge around assessment

(Deneen & Brown, 2016). This highlights the importance of a focus on affective dimensions in the framework under development in this project.

Teachers' assessment identity is important because those who are positive about assessment will go beyond embracing the '*letter of assessment for learning*' to embracing the '*spirit of assessment for learning'* (DeLuca et al., 2018). This means that rather than procedural and superficial assessment, teachers will use assessment as an opportunity to provide authentic and real-world experiences that build learners' metacognitive skills.

Reinforcing skills and knowledge

Beyond ensuring that teachers gain positive attitudes, beliefs, feelings, and values about assessment, it is also important to ensure that they are supported to retain these during their careers. A host of factors, including the expectations placed on them by schools can cause teachers to slip away from progressive assessment practices to more traditional models focused on summative assessment (Coombe et al., 2020; DeLuca et al., 2016a; DeLuca, Chapman-Chin, et al., 2019).

Sometimes when teachers try to implement good assessment practices in their class, in the long run they shift back to following more traditional forms of assessment focussed on rote or on summative assessment at the end of a period of teaching (Coombe et al., 2020; DeLuca et al., 2016a; DeLuca, Chapman-Chin, et al., 2019). This suggests that teachers' assessment practices can be superficial. For good assessment practices to be a constant, teachers need to have opportunities to learn to internalise the knowledge, develop the skills, and adopt an attitude which promotes assessment for learning.

At the same time, it is important for teachers to have belief in their assessment skills and knowledge. Even when training programmes in assessment techniques do not always lead to better assessment practices, they have been shown to lead to greater teacher self-efficacy (Gotch & McLean, 2019). Teacher self-efficacy refers to the belief that they can effect positive changes in the classroom (Miller et al., 2017) and is proven to positively impact teaching practices (Holzberger, 2013). It has been shown to be related to career stage, increasing up to mid-career and then levelling off (Dicke et al., 2014).

Teachers have been found to possess a jagged profile of self-efficacy beliefs, with those with self-efficacy in instructional strategies perceiving themselves as capable of using a variety of strategies in teaching and

assessment (Perera et al., 2019). Interestingly, teachers who report greatest interest in professional development in assessment practices tend to be those who regard themselves as highly effective teachers overall (Perera et al., 2019). This concurs with research that finds that those who are most skilled in assessment have the least confidence in their assessment skills (Kruse et al, 2020).

Where participation in professional learning has been shown to increase self-efficacy in assessment, this has been more focused on the evaluation of assessment than the development of assessment tasks (Kruse et al, 2020). This reflects the complexity involved in the development of assessment materials. This also highlights the need to be wary of drawing broad assumptions about the correlation between self-efficacy, knowledge, and skills. As one study found, some teachers are skilled and knowledgeable about assessment but not confident, while others gain confidence along with gaining skills and knowledge (Bruun & Evans, 2020).

Recognition of contexts for assessment

IB teachers carry out their assessment practices within a range of contexts, and it is important that they recognise these, are able to reflect on their influence on their assessment practices and are able to access the information required to ensure that their practices are compliant.

As the document review summarised in this report identifies, there are several important IB documents that set out expectations around assessment for programme coordinators and teachers. It is important that teachers are cognisant of the guidance around assessment included in all relevant documentation. This includes documents relevant to all IB programmes, programme-specific documents, subject-specific documents, teacher support materials and workshop materials.

While IB programmes are universal in nature, the way in which they are practiced is inevitably influenced by the education systems, countries and cultures in which schools are located. Legal obligations are one element of this. Each country is likely to have its own set of legislative requirements and practices around school assessment, including whether learners have to participate in a national or regional assessment.

National assessment programmes are very common and are increasingly being substituted by regional assessment programmes – including SACMEQ in Africa, SEAPLM in South

East Asia, PILNA in the Pacific Islands, PASEC in West Africa, and LLECE in Latin America (Clarke & Luna-Bazaldua, 2021; Greaney & Kellaghan, 2008). It is important for IB teachers to be aware of the national context for assessment and the ways in which this may impact on their practice and on broader understandings of the assessment in the context in which they teach.

It is also important for IB teachers to recognise that assumptions about assessment are not the same everywhere (Darling-Hammond & McCloskey, 2008; Black & Wiliam, 2007; Rotberg, 2006). While there is a movement towards a greater focus on formative assessment in many countries, the speed and generalisability of this varies. This is partly due to "*contradictory messages given to school leaders and classroom practitioners*" (Birenbaum et al, 2015, 135). This raises the importance of teachers being able to explain why they are taking a particular approach to assessment and the benefits of doing so, to educational stakeholders, including parents, who may have different expectations.

Elements of the framework

Based on the literature review in this section, and the teaching experience of the researchers undertaking this project, the elements of the Assessment Literacy and Design Competence Framework shown in

Table 5 were identified.

Table 5: Framework Components – Teachers' Assessment Identities

Component	Objective
Positive Beliefs and Attitudes	IB teachers have positive beliefs and attitudes about the role that assessment plays in improving learning.
Assessment Self-Efficacy	IB teachers have confidence and belief in their assessment skills.
Reflecting on Personal Experiences	IB teachers recognise that their assessment beliefs and practices are conditioned by their personal experiences.
Legislative Requirements	IB teachers are aware of the legislative requirements for assessment in the education system(s) in which they teach and have the skills to ensure that their assessment practices meet these requirements.
Cultural Expectations	IB teachers are aware of the cultural expectations for assessment in the contexts in which they teach and can explain their approaches to assessment in ways that are acceptable to educational stakeholders.
Assessment Alignment	IB teachers reflect on the suggested approaches to assessment in relevant programme guides, subject guides, and support materials, and align their assessment practices with these.

Teacher Profile 3: PYP Teacher

This profile is that of a teacher in the Primary Years Programme. As part of their role, they take responsibility for all six subject groups within the programme of inquiry for their class, though teaching in two subjects (music and PE) is led by specialist teachers in their school. This teacher reads and uses the following documents:

Document Name	Document Type
Assessment principles and practices: quality assessments in a digital age	Continuum documents
Programme standards and practices	
PYP Learning and teaching	Programme documents
PYP The learner	
PYP The learning community	
The PYP as a model of transdisciplinary learning	
PYP Unit of inquiry planner	
PYP arts scope and sequence	Subject guides
PYP language scope and sequence	
PYP mathematics scope and sequence	
PYP personal social and physical education scope and sequence	
PYP sciences scope and sequence	
PYP social studies scope and sequence	
PYP Developing a programme of inquiry	Subject teacher/ Coordinator support materials
PYP Inquiry in a primary setting	
PYP Approaches to learning	

In addition, this teacher has attended one IB workshop: Category 2 Evidencing learning in the PYP, which is a workshop that focuses on assessment in the PYP context.

The profile shown in **Figure 7** illustrates the potential access to assessment literacy and practice information for this hypothetical PYP teacher. From this PYP teacher's perspective, both assessment literacy and assessment operations are broadly addressed in the continuum documents.

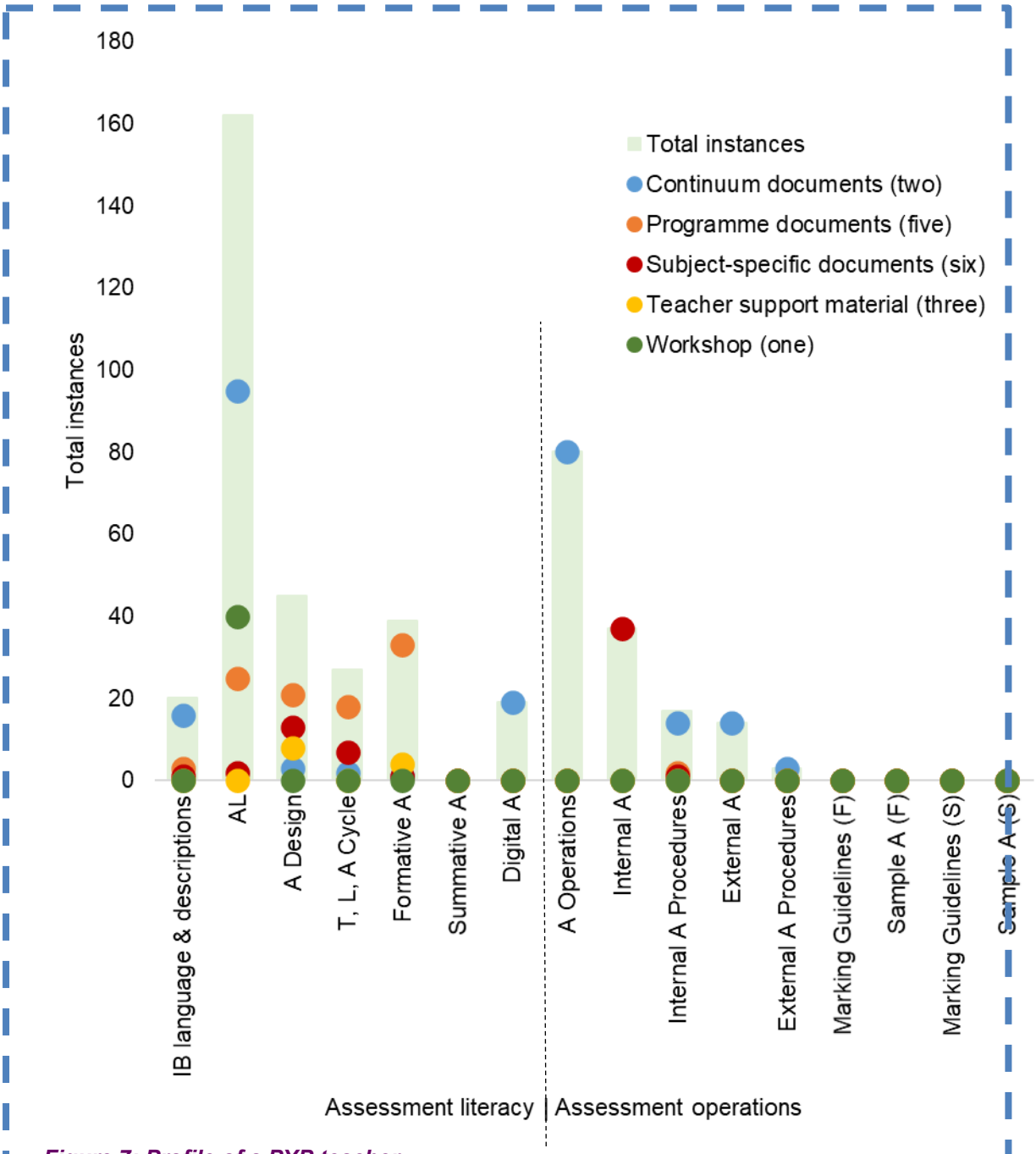


Figure 7: Profile of a PYP teacher

The PYP documentation has more emphasis on assessment literacy overall, compared to assessment operations, which is likely attributable to the requirement that assessment in the PYP is internal to the school rather than externally offered by the IB. The assessment literacy references are concentrated at the continuum level, even though they are evident at each level of PYP documentation

Professional Development

Assessment literacy and career phases

Multiple research studies reveal three dominant factors that influence teachers' assessment literacy and help shape their assessment practices throughout their career. The three factors are: classroom experience, participation in professional development opportunities, and participation in assessment moderation exercises to establish a community of practice (Adie et al., 2020; Bijsterbosch, Béneker, Kuiper, & Schee, 2019; Cowie & Cooper, 2017; DeLuca et al., 2019; Hopfenbeck, 2018).

The reference to both professional development and communities of practice hints at the importance of ensuring that teachers receive ongoing professional learning opportunities in a supportive environment. Novice teachers cannot be expected to have sophisticated assessment literacy and it needs to be nurtured throughout their careers. Accordingly, senior teachers have a key role to play in mentoring their colleagues.

The literature suggests that progression along a novice-to-expert continuum requires establishing a strong knowledge base of technical concepts and procedural knowledge. Teachers' experiences, beliefs, and learning have the potential to uniquely shape their assessment literacy (Looney et al., 2018b; Xu & Brown, 2016). Studies across a breadth of geographic areas – Canada (Coombs et al., 2018; DeLuca, et al., 2019), Norway (Rønsen & Smith, 2014) and China (Xu, 2017; Xu & He, 2019b) – emphasize the differences in teachers' assessment approaches and literacies across different points in their career.

At later stages of teachers' careers, they develop automaticity and fluidity within a context of practice (Coombs et al., 2018). Older research suggests that novice teachers and expert teachers have very different ways of reading the classroom, organising knowledge, and planning for practice. While novice teachers spend a lot of time looking at things individually and trying to connect them to their technical knowledge base, expert teachers tend to look at the bigger picture and respond to situations more intuitively – perhaps reflecting the internalisation of principles that lead to successful delivery in the classroom (Borko et al., 2005).

With regard to specific types of assessment practices, research shows that more experienced teachers place more emphasis on peer assessment activities (Wen et al., 2006) and in giving learners more complex assessment tasks (Deneen & Brown, 2016; Birenbaum & Rosenau, 2006). This evolution does not occur

organically but is brought about by a combination of professional learning opportunities and an increase in understanding of the value of assessment (Levy-Vered and Alhija, 2015).

While it is easy to specify the characteristics of teacher assessment literacy for opposite ends of the spectrum – from limited to fully embedded – it is more difficult to build the scale in between (Coombs et al., 2018). More research needs to take place to develop a teacher professional learning progression of assessment literacies. It will benefit the domain of teacher assessment literacy if we take a leaf out of learning progression research carried out for learners. Learning progressions denote:

> *"… Descriptions of the successively more sophisticated ways learners' thinking about an important domain of knowledge or practice develops as children learn about and investigate that domain over an appropriate span of time" (Corcoran et al., 2009: 37).*

Establishing a clear learning progression of teacher assessment literacy will allow for the planning of effective professional development training and teacher assessor identity development. This will also pave the way for a more formal and descriptive role of teachers as assessors in teacher professional standards as they move from novice assessors to expert assessor roles.

Ongoing professional development

It is evident that teachers constantly reimagine their '*teacher as assessor*' identities throughout their career (DeLuca, Willis, et al., 2019; Willis et al., 2013b). Intuitively, it can be said that no two teachers' learning paths will be the same. Every teacher, just like every learner, is unique and will have different factors influencing his/her learning at different times in their career.

One approach in improving not only knowledge of assessments, but also teachers' attitudes to it, is through continuous professional development. By ensuring continuous professional development for teachers on assessment literacy, and particularly on new forms of digital assessments, they can be empowered to confidently translate that knowledge into practice.

Professional learning needs to be designed to suit particular needs, however. Supporting teachers' assessment literacy requires understanding *what* those teachers need to learn about assessment, and *how* to best deliver that support (i.e.,

their preferred mode for professional development). Teachers often have different learning goals and preferred approaches for their professional learning, so it is important to consider how support can be tweaked to suit their areas of confidence, development priorities, and preferences (DeLuca et al., 2016b).

Workshops have a role to play and have the potential to positively impact the knowledge, skills, and self-efficacy of teachers in assessment (Gotch & McLean, 2019; Mertler, 2009). As in other forms of continuous professional learning, it is important that workshops are aligned with the context of everyday classroom practice (Popham, 2011; Volante & Fazio, 2007).

In addition, encouraging the development of communities of practice allows assessment decisions to be reflected upon. They provide an environment which encourages teachers to take risks and implement their assessment practice without fear of repercussion (Adie, 2013; Adie et al., 2020; Bijsterbosch, Béneker, Kuiper, & Schee, 2019; Hopfenbeck, 2018; Levy-Vered & Alhija, 2015; Looney et al., 2018b).

One approach to supporting teachers' assessment literacy is to evaluate teachers' current assessment literacy and then consider ways to enhancing it. One such approach should fully account for the range of assessment activities and knowledge teachers require within the current landscape of schooling (DeLuca et al., 2016b). The 'Approaches to Classroom Assessment Inventory' (ACAI) assesses three dimensions: 'Approaches to Classroom Assessment'; 'Perceived Skill in Classroom Assessment'; and 'Assessment Professional Learning Priorities and Preferences' (DeLuca et al., 2016b).

In assessing teachers' assessment literacy, the ACAI helps construct baseline data on teachers' approaches to classroom assessment. The ACAI, or, more broadly, any instrument assessing teacher assessment literacy should support data-informed professional learning in classroom assessment (DeLuca et al., 2016b). Another approach to enhancing teachers' assessment literacy is to match teachers with researchers in a collaboration around assessment data-based decision making (Will et al., 2019). This could involve researchers providing tools for teachers to use with learners and teachers committing to use the data they generate.

Elements of the framework

Based on the literature review in this section, and the teaching experience of the researchers undertaking this project, the elements of the Assessment Literacy and Design Competence Framework shown in

Table 6 were identified.

Table 6: Framework Components – Professional Development

Components	Objectives
Communities of Practice	IB teachers have regular opportunities to consult with their colleagues on assessment practices, including assessment design and implementation, and the interpretation and use of assessment data.
Support from Colleagues	IB teachers receive ongoing support and advice from their colleagues on how to enhance their assessment practices, including collaborating on assessment implementation.
Assessment Specialists	Schools have identified teachers who have specialist skills and understanding in different elements of assessment and who have ongoing opportunities to share their expertise with their colleagues.
Professional learning	IB teachers can access professional learning opportunities on specific assessment practices that are tailored to their current skills and understandings and that are available at times and in formats that suit their needs.
Up-to-date professional learning	Professional learning opportunities for teachers are continually updated and revised to remain abreast of best practices in assessment and the availability of new tools and approaches to assessment.

School Environments

School approach to data usage

As identified in a previous section, recent research has focussed on rethinking the assessment literacy construct from being purely measurement theory oriented towards seeing the need for teachers to develop assessment identities. This includes the need for them to negotiate power relations in class and school contexts, and practice assessment against the backdrop of social and cultural contexts (DeLuca, Chapman-Chin, et al., 2019; Willis et al., 2013a).

Beyond professional learning opportunities, however, schools can also create enabling structures for assessment literacy among teachers. This is important as there is often a lack of alignment between assessment strategies adopted by teachers and the principles set out in official school policies (DeLuca et al, 2016a).

Supportive environments are those in which school leaders clearly articulate the importance of using data to inform improvements. Beyond this, they have systematic plans, processes, and support to implement assessment practices and use assessment data (ACER, 2016). Specifically,

> *Data are used throughout the school to identify gaps in student learning, to monitor improvement over time and to monitor growth across the years of school. A high priority has been given to professional development aimed at building teachers' and leaders' data literacy skills (ACER, 2016, 5).*

Data-informed decision making is considered important for school improvement. The case study of data use in five countries (United Kingdom, Germany, Poland, Lithuania, and the Netherlands) show that schools use data for school development, accountability, and instructional improvement. The schools, however, struggle with similar types of problems: e.g., lack of access to high quality data, lack of professional development in using data, and a lack of collaboration around the use of data (Schildkamp et al., 2019).

Downey & Kelly (2013) found that the frequency of training in data use appears to be positively linked to teachers' self-reported level of understanding of data. Their research suggests that teachers with no formal leadership roles require regular training to significantly improve their understanding of data. Teachers strongly feel that data analysis and interpretation should be delegated to a

greater extent throughout the staff in the school, instead of just being conducted by more senior members of the school leadership team.

One way to achieve greater collaboration, and empower teachers to optimise data use in schools is by using data teams. Data teams take on the responsibility for analysing and interpreting a school's assessment data and supporting colleagues to use it to inform their teaching (Crone et al., 2016). These teams could be comprised of teachers and school leaders, and they would work together to interpret data and implement interventions based on the evidence. Schildkamp et al (2019) suggest five key building blocks for school leaders wanting to build effective data teams in their school:

(1) Establishing a vision, norms, and goals
(2) Providing individualized support
(3) Intellectual stimulation through sharing of knowledge
(4) Creating a climate for data, and
(5) Networking to connect different parts of the school organisation.

All these steps are important building blocks to create sustainable data use practices, where data is used to improve education.

Ideally, data teams would consist not just of those who need to use data in order to understand patterns (similarities, differences, trends and other relationships), but also more advanced analysts who can conduct and interpret more sophisticated analysis (e.g., using Item Response Theory to examine how different questions may be biased against certain groups of students, or using advanced data visualisation for stakeholders' reports).

Data teams provide an opportunity for interventions to be designed and outcomes to be monitored, and there is evidence that members of data teams actively use data to adjust classroom instruction (Ebbeler et al, 2016). Data teams can also engage in collaborative enquiry around data trends across the school (Bolhuis et al, 2019).

School leaders can support these data teams and embed the use of data in decision making. This can be enabled through defining goals, providing support, giving autonomy, creating a supportive environment for the use of data, and bringing together staff from across the school to collaborate (Schildkamp et al., 2019). Leadership representation at data team meetings is also beneficial in identifying

professional learning needs (Garry, 2021).

Importantly, data teams should engage in ongoing professional learning themselves, as well as supporting other colleagues across a school. To have sustained data use, it is important that schools develop ongoing processes for using data (Hubers et al., 2017).

School approach to formative assessment

Similar to the use of data to inform interventions that support learning, formative assessment practices are strengthened when supported by school leaders. Leaders can create a school culture in which ongoing formative assessment is regarded as an expectation for quality teaching. This is important because even if teachers are willing to use formative assessment, they may not feel ready or able to do so (Deneen et al., 2019).

Numerous studies have pinpointed the importance of support for assessment literacy from school leadership. This includes providing support and training to enable effective implementation (Hollingworth, 2012), mentoring of teachers (Xie & Cui, 2021) and individual feedback to teachers that targets professional development needs (Brink & Bartz, 2017). Other support includes modelling how best to use formative assessment and the data collected from it (Lane et al., 2019), which may require leaders to undertake professional learning themselves (Love & Crowell 2018).

School leaders can also create an environment in which collaboration between teachers on assessment is expected. As Lane et al. (2019, 81) suggest:

> *"A school climate of trust, mutual respect and cooperation is associated with higher quality formative assessment practices compared to a climate of mistrust, stress and competition between teachers".*

Collaboration is an important factor in the uptake and success of formative assessment. Teachers working in environments in which they are supported by peers and school leaders are more motivated to enhance their formative assessment practices (Harris & Brown, 2013; Birenbaum et al., 2011). A context in which teachers support each other has been shown to determine the success of assessment for learning (Heitink et al. 2016). If there is insufficient school support, teachers are less likely to utilise formative assessment, or to utilise it well (Zi et al., 2021; Crichton and McDaid, 2016).

Elements of the framework

Based on the literature review in this section, and the teaching experience of the researchers undertaking this project, the elements of the Assessment Literacy and Design Competence Framework shown in

Table 7 were identified.

Table 7: Framework Components – School Environments

Components	Objectives
Collaboration on Formative Assessment	School leaders expect teachers to collaborate with each other in formative assessment practices and establish a school climate in which formative assessment is encouraged.
Data Teams	School leaders establish and participate in data teams within schools that analyse assessment data, design interventions and support colleagues to utilise data in informing teaching practices.

Engagement of Learners

Summary of key literature

The importance of learners being engaged as partners in assessment is a key area of emphasis in discussions of good assessment practices. Jones (2014) refers to 'responsive teaching' whereby the teacher responds to the needs of learners as they arise, creating more collaborative opportunities for peer teaching and providing more useful feedback to learners by making them more aware of their progress.

Teachers' classroom assessment practices are incredibly powerful in encouraging students' learning, but can also have a constricting effect if they are, for example, solely focused on rote learning instead of more meaningful ways of learning (Bijsterbosch et al., 2019). One of the ways to achieve this meaningful learning is by ensuring that learners are encouraged to build their own assessment literacy.

Learner's assessment literacy

Helping learners develop their own assessment literacy relies on teachers being able to clearly communicate and exemplify their own practices. This relates to the need for learners to understand their learning goals. This can be achieved by ensuring that success criteria for any given learning goal is always clearly communicated to, and understood by, learners (Duckor & Holmberg, 2019).

Furthermore, learners need to be encouraged to identify their own strengths and areas for improvement (Charteris & Thomas, 2017) and to develop metacognitive skills (Dixon et al., 2011). Using instructional practices that include questioning, probing and making thinking visible can further exemplify to learners the effectiveness of assessment (Duckor & Holmberg, 2019), and contribute to their assessment literacy. Encouraging learners to become more involved in assessment increases their confidence in what they are expected to learn and to what standard. They become more active in their learning and start to 'think like a teacher' (Hattie, 2019).

Apart from becoming active learners, teachers can also involve their students in designing questions and assessments that they think demonstrate their own learning. This can not only create an environment that allows learners' creativity to flourish, but it can also enable those learners who are technologically minded to integrate technology in a novel and innovative way into designing and implementing assessments (Rickert, 2018).

Overall, developing learners' assessment literacy is a recognised way of embedding assessment literacy

in teaching and learning. This embedding of assessment literacy has led to a focus on the types of questions asked, an emphasis on learners' applying their learning, and the use of a range of assessment types. Bijsterbosch et al. (2019) suggest that by moving towards this type of applied and evaluative assessment teachers will encourage more active and meaningful learning.

Engaging learners in assessment, by using multiple strategies for assessment (Siegel & Wissehr, 2011), ensures learners are developing their own assessment literacy. This involves the explicit creation of learning goals and ensuring that learners understand these goals, creating tasks that allow learners to apply their knowledge, providing a variety of assessments, and having self-assessment opportunities.

Student involvement in their own learning is a key principle upon which IB assessment is designed. Learners are encouraged to engage with IB assessment criteria, for example, through systematic use of assessment criteria (IBO, 2015) or task-specific clarifications (IBO, 2014) that, in turn, help learners identify learning goals and understand the success criteria for those goals. This identification and understanding of learning goals is a necessary foundation for self- and peer-assessment.

Self- and peer- assessment

Peer and self-assessment are important for learners to become autonomous learners. Teachers can facilitate this by modelling how to make judgements about the quality of work as it is being produced (Dixon et al., 2011). To do this, learners need to understand the criteria against which work will be judged, again highlighting the need for teachers to explicitly share learning goals and criteria with learners.

Self-assessment involves learners reviewing their own work and learning and reflecting on their progress against the success criteria they developed in conjunction with the practitioner. They consider how well they have performed the work being undertaken and the strategies they have used. It assists them to recognise and affirm their achievements and understand what still needs to be learnt, what they need to do next and the type of assistance they may require to progress. Self-assessment can build motivation and belief in learners' own ability to learn and motivate them to take more responsibility for their own learning (Boud et al., 2015). Self-assessment opportunities can also give learners a chance to actively engage in questioning and reflecting upon their own learning, and allow them to

become more self-regulated learners (Panadero et al., 2016, 2018).

Brown et al. (2015) raised important issues of learners being able to give honest and accurate feedback on their own work finding that:

- Some learners give themselves lower marks because they would be embarrassed if the teacher discussed their work sample in front of the class.
- Some learners purposefully give themselves inflated feedback because they do not want to be teased for lower achievement levels.
- Some learners report either inflating or deflating their marks but acknowledge their real scores internally and note what they need to improve.

In light of these findings, Brown et al. (2015) recommend that teachers need to be on the lookout for such trust and respect pitfalls. They suggest further research needs to be undertaken to check if repeated opportunities for self-assessment remove these issues.

Having mastery of self-assessment strategies is essential before engaging in peer feedback. This will ensure learners are practised in how to comment effectively on one another's work in a supportive manner. These questions are examples of useful prompts to assist learners to self-assess (Victoria State Government, 2019):

1. What did I learn today?
2. How do I know I learnt this?
3. What am I confused about?
4. How can I clarify this?
5. What do I want to know more about?
6. How am I going to find out more?
7. What am I going to work on next?
8. I was surprised by…
9. I was challenged by…
10. I was excited when I discovered…

Using these prompts allows learners to assess their learning and progress on the task. Teachers can also encourage learners to maintain learning/reflective journals where they write down thoughts about their progress and performance on each task. This can help with the internalisation and clarification of concepts.

Peer feedback involves learners in feedback on one another's work in relation to the success criteria collaboratively determined at the beginning of the semester, unit, or lesson. Learners discuss the extent to which each other's work meets the success criteria and learning outcomes established by the class at the start of the learning process. Peers

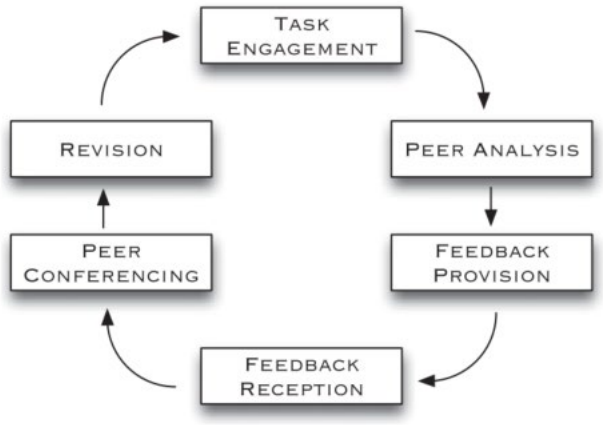
provide advice and help each other to improve their work.

By thinking and discussing what needs to be improved in a piece of work learners begin to gain a deeper understanding of what constitutes a satisfactory realisation of the success criteria. Peer assessment can also help boost creativity, particularly when assessing work that involves the use of problem-solving skills (Susilawati et al., 2020). Learners can learn to ask meaningful questions that target the logic of presented solutions and look at presented solution from a range of angles.

Reinholz (2016) suggests the following model to carry out peer-assessment (see **Figure**). Teachers need to allow learners to take part in all the steps – peer analysis, giving and receiving feedback, discussing views with their peers, and offering scope for revision of the final work in order for peer-assessment to be useful in developing learner skills.

Peer assessment directly contributes to active and self-regulated learning, and builds learners' behavioural and meta-cognitive skills at the same time (Carvalho, 2013). Yu & Wu (2016) show that when learners take on the role of assessor during peer-assessment activities, it helps in developing a learner's sense of quality.

Figure 8: Peer Assessment model (Reinholz, 2016)



Using data with learners

In many educational systems, teachers have access to a wide variety of data. The expectation is that teachers can interpret, use and report on data at the local (classroom, school) and national level and to recognise the role assessment can play in supporting and not just measuring learning (Cowie & Cooper, 2017). Research shows that when teachers use student achievement and progress data to drive instructional decisions (Ottmar et al., 2015), it leads to overall improvements in outcomes. Less is known, however, about learner's own understanding of this process.

To engage learners in assessment, the assessment data needs to make sense to them. The knowledge and skills that teachers require to explain data effectively are broad and embedded in the process of teaching

itself (Mandinach & Gummer, 2015). Teachers are required to be able to interpret and disseminate assessment results in a way that helps learners understand their performance and their strengths and weaknesses in their learning journey. In many schools, learners work directly with teachers to use their results to set objectives for their next steps. Teachers also use data to produce reports that are based on their judgement of learner's progress. (Richardson et al, 2020).

Using reports is a key communication channel between school and learner but it is important that schools are aware of the messages they convey, whether intentionally or unintentionally. Research indicates that sometimes much of what is written is generic, un-actionable statements that are of little benefit to learners (Turner et al., 2019). Very often these reports are result of stand-alone summative assessment that provides little practical use to learners. A more beneficial way of reporting is when assessment results are mapped onto learning progressions.

According to ACER (2018) learning progressions are essential tools for understanding students' progress in their learning. They enable teachers to identify where students are in their learning, and help learners understand their assessment results through presenting meaningful descriptions of their learning progress, with its associated knowledge and skills. Morell et al (2017) suggest that their use cultivates learners' development as effective learners, by ensuring the learning goals have been achieved at the end of the learning period.

There is a need for more informed use of assessment data that learners can understand. Teachers are often required to account for student learning and to compare their results with national-level data in the expectation they use this to inform practice (Hardy, 2015). Data, however, not only enables teachers to better target their instruction to learners needs and strengths (Cowie & Cooper, 2017), but can ultimately result in higher engagement of learners in their own learning journey.

The role of feedback

Black and Wiliam (1998) and Hattie (2009) emphasized the power of feedback in influencing learning. When learners are provided opportunities to self and peer assess they should also be guided on how to give feedback to impact learning. This is once again something that digital tools can support, but only if the underlying principles are well understood by teachers and learners. The fundamentals of effective feedback ensures that any results that are

communicated will inform future improvements.

While peer feedback plays an important role in assessment, giving learners the opportunity to take charge of the management of their own learning and even replacing teacher feedback to a degree (Voogt et al., 2013), it is not without its challenges. Some learners may not accept peer feedback as accurate, some may feel uncomfortable assessing their peers while some may consider it a burden in addition to their studies (Carvalho, 2013). In addition, approaches to peer feedback can vary. Boud et al.'s (2015) study found that learners differ in their approach:

- **High achievers** already have a well-developed sense of judging their own work so are good at peer-assessment.
- **Low-performing learners** have a poor sense of self and are hesitant in judging peers' work, showing only modest improvement in judging ability over time.
- **Mid-range learners** show over-confidence initially but, over time, show the most improvement in giving good judgement of peers' work.

Importantly, the value of any feedback, whether from teachers or peers, depends on how students perceive, interpret and act on it. A recent meta-review of feedback research (Van der Kleij et al., 2019) examined how the student role in feedback has been conceptualised in reviews of feedback over time. The review placed reviews of feedback research along a 4-category continuum of student role, ranging from "no student role - transmission model" to "substantial student role - dialogic model". The findings indicate that while reviews have evolved towards the student-centred perspective, this is not a linear progression across categories. Nevertheless, there is increasing recognition that the relationship between feedback and student learning may be influenced by different variables, and that taking account of the student perspective in feedback effectiveness is critical.

Key elements of feedback include (Sadler, 2010):

- What was incorrect?
- Why was it incorrect?
- How does this align with success criteria?

In addition to the provision of targeted information, it is further important that feedback is delivered in a supportive manner and as part of ongoing dialogue between teachers, peers, and learners. Moreover, assessment has affective dimensions (Khine & Areepattamannil, 2016) and this needs

to be considered when providing feedback – it needs to be conducted sensitively and constructively. ICT can assist this process by providing feedback in 'manageable units' which facilitate easier processing by their recipients (Shute & Rahimi, 2017).

This indicates the need for and emphasis on teachers to develop feedback practices that best support learners. While peer feedback can assist learners to become teachers of each other, and to develop a growing understanding of how to learn in the domain being studied, it is equally important that teachers are trained in pedagogical skills which simulate and support these assessment practices (Panadero et al., 2016). The process of teaching learners how to provide effective feedback, will also fine tune teachers own practices, and lead to improvements in learners' progress.

Elements of the framework

Based on the literature review in this section, and the teaching experience of the researchers undertaking this project, the elements of the Assessment Literacy and Design Competence Framework shown in

Table 8 were identified.

Table 8: Framework Components – Learner Engagement

Component	Objective
Assessment Literacy of Learners	• IB teachers support learners to gain assessment literacy.
Learner Assessment	• IB learners know learning intentions and success criteria and are involved in designing and implementing assessment.
Self-Assessment	• IB learners regularly undertake self-assessment as a means of enhancing their learning.
Peer-Assessment	• IB learners regularly engage in peer assessment
Encouraging Data Usage	• IB teachers encourage learners to use assessment data to identify how they can improve.
Providing Feedback on Assessment	• IB teachers share assessment results in a way that informs future improvements.

Integration of Digital Assessment

Digital tools in teaching and learning

Across and beyond the curriculum, information and communication technologies (ICT) – also referred to as digital technologies - are changing teaching, learning, and assessment processes as well as what learners are expected to demonstrate. The rise of digital media now enables learning to take place anywhere and anytime. Mobile devices, online teaching, and virtual classrooms provide new environments for effective learning (Khlaisang & Songkram, 2019).

These technologies enable more:

- learner-centred approaches and personalisation of learning (FitzGerald et al., 2017)
- enhanced critical thinking skills among learners (Yarbro et al., 2016)
- greater opportunities for collaboration and field work (Gokhale & Machina, 2018)
- instantaneous feedback (Tancock, et al., 2018) and
- approaches to teaching and learning informed by learning analytics (Nussbaumer et al., 2015; Hernandez-Lara, et al., 2018; Vieira et al., 2018).

The impact of the Covid-19 pandemic on schools has inevitably accelerated the adoption of digital tools in teaching and learning. Less is known about the use of digital assessment tools, however, with anecdotal evidence that teachers are continuing to rely on traditional forms of assessment.

To successfully integrate digital assessments into their practice, teachers may need to adopt a more multimodal perspective, whereby aspects of digital assessments (for example, through the use of videos, games, or audio clips) become a part of multimodal tools available to them when creating assessments.

It is important to ensure that there is an integration between digital pedagogies and digital assessment, allowing forewash and backwash to be optimised. This suggests an urgent need for teachers' assessment literacy to be expanded to take in digital modes of assessment.

Digital assessment

Oldfield et al., (2012) amalgamated a list of potential benefits that technology may offer assessment. Their main points were that digital assessment could:

- Provide immediate, learner-led feedback
- Potentially increase learners' autonomy, agency, and self-regulation
- Provide support for collaborative learning

- Provide authenticity
- Widen range of measurement
- Provide flexible and appropriate responses
- Increase efficiency and reduce teachers' workloads
- Improve learner performance
- Integrate formative and summative assessments, and
- Improve assessment validity and reliability.

The authors further found that e-assessment could improve efficiency regarding marking, moderating, and storing information as teachers should be able to use their resources better (Oldfield et al., 2012). Moreover, using ICT provides opportunities to assess complex knowledge and reasoning that may not be possible to assess through traditional methods (Jamil et al., 2012).

Despite the many affordances of digital assessment, however, schools were formerly slow to adopt digital practices in teaching, learning and assessment (Whitelock, 2010). The Covid-19 pandemic has dramatically altered that reticence, however. Teachers and learners in many countries have undergone a rapid shift to the use of digital technologies in all aspects of their interactions, using software such as Microsoft Teams and Google Classroom.

At the same time, digital assessment has been used to a far greater degree than ever before. For example, a European Union project is exploring the use of formative digital assessment in five European Countries (Judge, 2021). When digital tools are used for formative assessment, these often include automatic feedback to learners, which has been shown to lead to enhanced learner achievement and motivation (Faber et al., 2019). The more sophisticated digital assessment tools include features such as interactive learning environments: these can enhance learner reflection and understanding (Barana & Marchisio, 2021).

Professional learning in digital assessment

With importance for teachers' assessment literacy, almost all digital assessment tools used are commercial ones that have been developed by experts. This means that teachers' assessment literacy in digital technologies needs to focus on how they can make judgements about which tools to use, rather than on teachers designing digital tools themselves (Goss et al., 2015).

The opportunities offered by digital tools can only be used effectively if they are educationally sound and fit the needs of particular cohorts of

learners (Fjørtoft, 2020). Moreover, the learning analytics provided should enable learners and teachers to actively monitor learning and inform decision-making about teaching strategies (Barana et al., 2019).

This means that professional learning for teachers in digital assessment needs to focus on key ways in which digital tools can be used to enhance assessment practices. For example, topics may include the following (Walker, 2007):

- Principles of assessment
- Key assessment design principles
- Online Assessment selection and design
- Introduction to common digital assessment tools
- Introduction to ePortfolios, and
- Innovative online assessment.

Moreover, it is important that teachers undergoing training in digital assessment design undertake digital assessments themselves, "*to replicate the demands upon which 'real' learners are placed under … in order to instil within participants an awareness of such issues when designing their own assessment tasks*" (Walker, 2007: 2). A list of key design principles may give teachers a checklist to evaluate tools against, such as (Walker, 2007: 3-4):

a. Online assessments should be **aligned** with the curriculum and relevant to the course learning outcomes.
c. Timely and meaningful **feedback** should be provided. The extent and nature of this feedback should reflect the purpose of the assessment and the nature of the online assessment method.
d. **Marking schemes** should be fair, transparent, weighted appropriately and clearly communicated to learners.
e. Online assessment tasks should be designed with **accessibility** in mind. Provision for 'reasonable adjustments' to accommodate learners with special needs should be considered, as should appropriate alternatives if potential adjustments prove inadequate.
f. Where appropriate, online assessment tasks should incorporate a range of **question types** to assess the breadth and depth of learner knowledge.
h. Online assessment approaches should be guided by the **level** at which the learner is studying.
j. Online assessments should not test a learner's **information technology skills** or their adeptness at using a specific online assessment tool unless that is the explicit purpose of the assessment.

Inevitably, professional development needs to continually evolve as digital technologies evolve. For example, it is now possible to undertake self- and peer-assessment using digital tools (Seifert & Feliks, 2019). Moreover, there is evidence that teachers will not adopt technological approaches to assessment until they are convinced that these will provide greater efficiencies (Bennett et al., 2017). This suggests the need to tailor professional learning on digital assessment to meet teachers' individual needs, something that has been shown to enhance their self-efficacy in utilising digital assessment (Hall & Trespalacios, 2019).

Digital tools can support peer feedback processes in various ways (Van der Kleij et al., 2019; Webb et al., 2018; Whitelock & Bektik, 2018) including:

- The use of social networking platforms for feedback discussions about homework
- Collaborative writing using online word processing and video
- Automated data analysis
- Step by step advice to correct errors, and
- Data visualization tools.

Once again, the selection of tools for peer and self-assessment must be done with caution. The use of tools does not take away the responsibility of teachers to help learners develop their capability to assess the work of their peers. It is the input from teachers, rather than the use of particular digital tools, that will determine the effectiveness of the feedback (Webb et al., 2018).

Building on what has been learned by teachers since March 2020, it is likely that innovations in digital approaches to teaching, learning and assessment will be the key to the future. This has implications for the competencies that teachers need to develop, as reflected by the European Framework for the Digital Competence of Educators (Caena & Redecker, 2019). The project has created a self-assessment instrument (https://ec.europa.eu/jrc/en/digcompedu/self-reflection) and identifies sophisticated digital assessment activities as:

- I systematically use a variety of digital tools to monitor student progress
- I systematically analyse data and intervene in a timely manner. and
- I systematically use digital approaches to provide feedback.

Assessment literacy for teachers around digital assessment includes how they can support learners to be comfortable using digital assessment tools. This is an extension of the need to scaffold learner comfort around the

use of digital teaching and learning more broadly, without assuming that all learners are equally comfortable (Gill et al, 2015).

While learners and teachers have been forced to adapt to digital technologies during Covid-19 related lockdowns, support for learners to gain a greater level of comfort is still required (Pittman et al., 2021). This includes taking account the social aspects of digital assessment if peer assessment is to be used (Stenalt, 2021) and differential impacts of digital assessment on learners according to their overall achievement levels (Faber et al., 2017).

This is particularly the case as, while the use of digital assessment can offer opportunities for enhanced equity, it can also replicate or reinforce biases in non-digital assessment (DiCerbo, 2020). Universal design principles to facilitate assessment accommodations are often legally required and it is important that teachers are aware of the implication of these (Scalise, et al., 2018), and of the opportunities available to support learners with additional support needs (Leria et al, 2021).

As digital assessment tools become more commonplace, assessment literacy of teachers will need to expand to the ability to design digital assessment tools themselves. This is currently cutting-edge practice and there is recognition of the need for extensive scaffolding until teachers are equipped to be digital assessment designers. One approach is to focus on collaborative design using digital tools to facilitate iterative digital design processes (Heredia et al., 2016).

As with any learning, there is a need to carefully scaffold digital assessment design learning for teachers (Hartell & Strimel, 2019). One recommendation is to follow these stages (Garreta-Domingo et al., 2018):

- Start with the basics of learning design
- Include an early evaluation task in which teachers use existing approaches to assessing learning
- Promote a 'cognitive walkthrough' approach to enable teachers to learn through asking questions, and
- Avoid bringing in technology until assessment design principles are understood.

The current state of digital assessment for some subjects is better known than others. In Hartell & Strimel's (2019) study, there were no clear model tests for technology teachers to use to design their own assessments. In contrast, teachers of other subjects often use expertly designed digital assessments, and sometimes even national assessments, for inspiration

and as prototypes (Boesen, 2006). Nevertheless, it needs to be recognised that many teachers have no official guidelines or examples, nor traditions in digital assessment to rely on.

Elements of the framework

Based on the literature review in this section, and the teaching experience of the researchers undertaking this project, the elements of the Assessment Literacy and Design Competence Framework shown in **Table 9** were identified.

Table 9: Framework Components – Digital Assessment

Components	Objectives
Critical Evaluation of Digital Tools	IB teachers are equipped to judge the extent to which particular digital tools will or will not enhance their assessment practices.
Purposeful Selection	IB teachers are empowered to select digital assessment tools based on their assessment objectives and the enhancements that the digital tools will enable in achieving these.
Value Add of Digital Tools	IB teachers use digital assessments to enhance their assessment practices to differentiate assessment tools and assess learners on complex knowledge and reasoning.
Learner Scaffolding	IB teachers scaffold learners' exposure to digital assessment tools to ensure that they can demonstrate their proficiency through digital tools.
Continuity with Teaching	IB teachers emphasise the use of digital assessment tools where this is a natural continuation of digital approaches to teaching and learning.
Ensuring Accessibility	IB teachers utilise digital tools for assessment that have either in-built or add-on capacity to accommodate a range of learner needs.
Developing Digital Assessment	IB teachers can explore and access professional learning opportunities on innovative digital tools for assessment as they become available.

Teacher Profile 4: MYP Coordinator with e-Assessment Focus

This profile is of a teacher who is the MYP Coordinator in a school, and who also teaches MYP language acquisition. The school is one that has opted into e-Assessment. The school is one that makes full use of the MYP eAssessment opportunities afforded by the IB, necessitating significant leadership time in terms of guiding teachers and students towards this end-of-programme milestone. As part of their role, the teacher reads and uses the following documents. In addition, this teacher has attended two IB workshops in the last few years: Category 3 Managing assessment in the MYP and Category 3 Creating authentic units.

Document Name	Document Type
Assessment Principles and Practices: Quality Assessments in a Digital Age	Continuum documents
Programme Standards and Practices	
Rules For IB World Schools	
Guide to Programme Evaluation	
Programme Evaluation FAQs	
Evaluation Self-Study Questionnaire	
MYP From Principles Into Practice	Programme documents
MYP Coordinator Notes M20	
MYP General Regulations	
MYP Further Guidance For Developing Assessed Curriculum	
MYP Assessment Procedures	
The Conduct of MYP On-Screen Exams	
MYP E-assessment Development Report	
MYP E-Portfolio User Guide	
MYP Statistical Bulletin M2019 Exam Session	
MYP Language Acquisition Guide	Subject guides
MYP Languages Further Guidance	
MYP Language Acquisition TSM	Subject teacher/ Coordinator support materials
MYP Part Complete Unit Plan Language Acquisition	
MYP On-Screen Examinations FAQs	

The profile shown in **Figure 8** illustrates the potential access to assessment literacy and practice information for this hypothetical MYP Coordinator and language acquisition teacher. In this MYP Coordinator's context, references to both assessment literacy and practical assessment procedures are spread across and within the different levels of documentation.

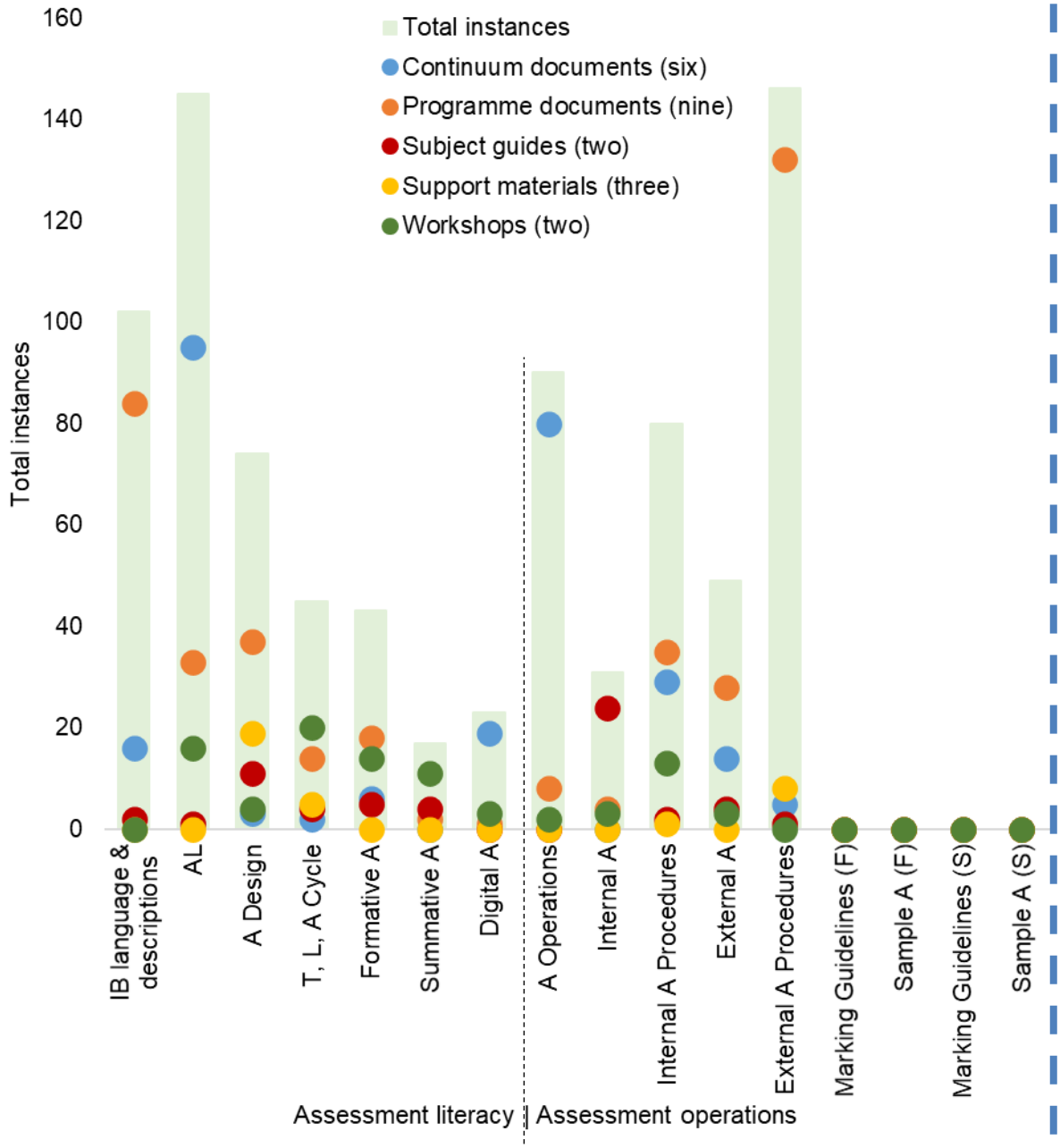


Figure 8: Profile of an MYP Coordinator in an MYP eAssessment school

As this hypothetical teacher is an MYP Coordinator (and therefore also an eAssessment leader), there are a relatively large number of documents to be read and used at continuum and programme level, however, the guidance towards both assessment theory and practice is apparent at each documentation level.

The Framework

The assessment literacy and design competency framework is provided below. For each topic area the key competencies included throughout this report are provided. For each one a suggested methodology for how teachers can strengthen these areas, in addition to suggested resources to enable them to do so, are provided. These resources are by no means comprehensive and there are many other ways in which schools and programme coordinators can support teachers to strengthen each competency.

The framework is intended to summarise the scope of assessment literacy that needs to be addressed within the IB. It is designed to target programme leaders, school leaders, programme coordinators, subject coordinators and those who design and implement professional development opportunities.

It is not the intention that every teacher should be competent in every element – that would certainly be asking too much. Instead, the Framework should be regarded as a guide for the range of elements that comprise assessment literacy, and that need to be considered in designing and using assessment tools (whether formal or informal). Each school should aim to have a spread of skills and knowledge on assessment to ensure that there is advice and support available for teachers to draw on.

Since assessment literacy is so wide-ranging in nature, and is also ever-changing due to technological advances, this is an area of professional practice for teachers that needs to continue to evolve throughout their careers. A combination of formal training, communities of practice, mentoring and opportunities to try out new approaches are required for teachers to be able to be competent in their assessment practices.

Ongoing and multi-faceted support from the IB, school leaders and programme leaders is fundamental in ensuring that schools have strong assessment practices. These need to be underlain by the understanding that assessment is central to teaching and learning, with the goal of making learning visible in order to inform the strategies of teachers and learners in enabling further progress.

Figure 9: Structure of Framework

Framework sub-components

For each of the key assessment practices that comprise to make up the structure of the framework, a series of characteristics have been identified. As has been identified elsewhere in this report, but bears repeating here, there is not an expectation that every teach masters every characteristic listed. Instead, a reasonable goal would be that at the school level there is a good spread of skills, knowledge, and practices across as many of these as possible.

As a starting point, it is wise for school leaders to assume that less experienced teachers only have very basic skills and understanding of assessment and that they will require significant support, mentoring and learning opportunities to build these over time. More experienced teachers may choose to specialise in particular elements of assessment or to gain a breadth of expertise across the suite of characteristics listed.

Assessment Practices	Characteristics
Assessment Knowledge and Skills	Evaluating Assessment Items
	Developing and Using Grading Rubrics
	Analysis of Assessment Data
	Informing Teaching Practices
Formative Assessment	Assessment Philosophies
	Selecting Assessment to Meet Goals
	Range of Assessment Activities
	Accommodating Learner Diversity
	Selecting Assessment Types
	Pitching Assessment Tasks
	Assessing Transversal Skills
Assessment Identity	Positive Beliefs and Attitudes
	Assessment Self-Efficacy
	Reflecting on Personal Experiences
	Legislative Requirements
	Cultural Expectations
	Assessment Alignment
Professional Development	Communities of Practice
	Support from Colleagues
	Assessment Specialists
	Professional learning
	Up-to-date professional learning
School Environments	Collaboration on Formative Assessment
	Data Teams
Engagement of Learners	Assessment Literacy of Learners
	Learner Assessment
	Self-Assessment
	Peer-Assessment
	Encouraging Data Usage
	Providing Feedback on Assessment
Integration of Digital Assessment	Critical Evaluation of Digital Tools
	Purposeful Selection
	Value Add of Digital Tools
	Learner Scaffolding
	Continuity with Teaching
	Ensuring Accessibility
	Developing Digital Assessment

Assessment Knowledge and Skills

	Requirements	Methodology	Possible Resources
Evaluating Assessment Items	• IB teachers have the skills and knowledge to evaluate the extent to which assessment items can generate reliable and valid data.	• IB teachers evaluate the extent to which MCQs meet high standards (e.g., the inclusion of distractors that minimise the likelihood of learners guessing while generating data about learner misconceptions, and the prompting of learners to use higher order rather than lower order thinking). • IB teachers evaluate the extent to which short and long open tasks call on learners to utilise higher order thinking, apply their skills and knowledge and/or respond to authentic situations.	• Brame, C., (2013). *Writing good multiple choice test questions*. Accessible from https://cft.vanderbilt.edu/guides-sub-pages/writing-good-multiple-choice-test-questions/
Developing and Using Grading Rubrics	• IB teachers can develop grading rubrics for open response tasks that enable fairness and transparency.	• IB teachers have the skills and knowledge to design grading rubrics that clearly establish the difference in expectations between learner responses of different levels of proficiency and do not favour particular styles of response over others. • IB teachers utilise the rubrics to grade learner responses in a way that is transparent and that provides learners with clear indications of how they can improve.	• Brookhart, S. (2013). *How to Create and Use Rubrics for Formative Assessment and Grading.* ASCD.

Analysis of Assessment Data	• Assessment data is routinely used by teachers to monitor learner progress and to identify the need for strategies to enhance learning.	• IB teachers are given data from school-wide and external assessment practices and are also expected to collect their own assessment data. • IB teachers can carry out analysis to identify key findings in assessment data that can inform their professional practice. • IB teachers are provided with training and support to enhance their data analysis skills.	• *"[In an outstanding school] data are used throughout the school to identify gaps in student learning, to monitor improvement over time and to monitor growth across the years of school … IB teachers routinely use objective data on student achievement as evidence of successful teaching".* (Masters, G (2012). National School Improvement Tool, p.5). Accessible from https://www.acer.org/files/NSIT.pdf) • *Working with Data* https://assessment.tki.org.nz/Using-evidence-for-learning/Working-with-data
Informing Teaching Practices	• IB teachers actively draw on assessment results to inform their own teaching practices.	• IB teachers utilise data-based decision making, drawing on assessment data to monitor their teaching, adjusting it to better meet learner needs and to inform differentiated teaching • IB teachers use data from assessment to identify and remove barriers to learner progress (either individually or as a cohort). • IB teachers are confident in explaining their approach to planning based on the use of empirical evidence.	• Datnow, A. & Hubbard, L. (2015). *Teachers' Use of Assessment Data to Inform Instruction: Lessons from the Past and Prospects for the Future* https://eric.ed.gov/?id=EJ1056748 • Harris, L. (2018). *Perceptions of Teachers about Using and Analysing Data to Inform Instruction* https://core.ac.uk/download/pdf/217229698.pdf • Timperley, H. (2009). *Using Assessment Data for Improving Teaching Practice* https://research.acer.edu.au/cgi/viewcontent.cgi?article=1036&context=research_conference

Formative Assessment

	Requirements	Methodology	Possible Resources
Assessment Philosophies	• IB teachers are aware of the philosophies that underscore different approaches to assessment and how these have (and continue to) evolve over time.	• IB teachers are aware of the traditional distinctions between assessment for/as/of learning and between formative and summative assessment, and the philosophies underlying these approaches. • IB teachers are given access to ongoing professional learning that exposes them to key philosophies underlying contemporary approaches to assessment (e.g., learning progressions and growth mindsets) as they evolve over time.	• Professional development courses on educational policy and practice • Latest research in education disseminated through newsletters, seminars, and professional learning sessions

Selecting Assessment to Meet Goals	• IB teachers can select the objective for a particular assessment practice and to determine which tools are appropriate to meet that objective.	• IB teachers are aware of a range of purposes for assessment such as:
		  • Certification
		  • Tracking learner progress
		  • Gathering data to enable empirically informed teaching strategies
		  • Informing educational interventions
		  • Monitoring growth over time
		  • Checking the understanding of concepts
		  • Enabling learners to apply their skills and knowledge
		  • Providing learners with an opportunity to engage in authentic tasks
		  • Enhancing learners' metacognitive skills.
		• IB teachers define the purpose of each assessment activity and consider what design and approaches will best achieve this.
			• Assessment Tool Selector https://assessment.tki.org.nz/Assessment-tools-resources/Assessment-tool-selector/(tab)/Choose-a-tool
			• Assessment practices that promote learning: https://www.aaia.org.uk/
			• Practice 'backward design' - https://www.learning-theories.com/backward-design.html
			https://educationaltechnology.net/wp-content/uploads/2016/01/backward-design.pdf

Range of Assessment Activities	• IB teachers can design and implement a range of assessment activities to meet assessment objectives.	• IB teachers are aware of a continuum of assessment activities that are available for them to use. These include:
		  • Using questioning to encourage higher order thinking
		  • Observation tools
		  • Self- and Peer- assessment
		  • Collaborative activities
		  • Presentations and debates
		  • Project work
		  • Formal examinations
		• IB teachers know when it is appropriate to use which approach, what insights each can generate and the strengths and weaknesses of different approaches.
			• Learning and Skills Development Agency (2005). Assessment for Learning https://dera.ioe.ac.uk/7800/1/AssessmentforLearning.pdf
			• NESET Report (2017). Assessment practices for 21st century learning: review of evidence https://nesetweb.eu/wp-content/uploads/2019/06/AR1_20172.pdf
			• Muskin, J. (2015). Student learning assessment and the curriculum: issues and implications for policy, design and implementation https://unesdoc.unesco.org/ark:/48223/pf0000235489

Accommodating Learner Diversity	• IB teachers are aware of the need to utilise a range of assessment activities to suit the diversity of learner needs and preferences.	• IB teachers identify the range of ways in which learners can express their skills and knowledge, and ability to apply these.
		• IB teachers actively vary their approaches to assessment to enable learners with strengths in written communication / spoken communication / group work / individual work etc. to demonstrate their skills and knowledge.
			• Professional development training on accessibility
			  • *Introduction to Accessibility and Inclusive Design*, Coursera Course (by the University of Illinois)
			  • *Basics of Inclusive Design for Online Education*, Coursera Course (by the University of Colorado)

Selecting Assessment Types	• In written tests, teachers are aware of the importance of selecting assessment types to meet defined assessment objectives.	• IB teachers are knowledgeable about different assessment item types (e.g., MCQs, short answer questions, long answer questions, responding to real world challenges) and their strengths and weaknesses.
		• IB teachers make active selections of which item types to include in any test paper to generate the kind of data that they wish to gather.
			• Examples of resources:
			  • https://www.mydigitalchalkboard.org/portal/default/Content/Viewer/Content?action=2&scId=505706&sciId=15311
			  • https://apasseducation.com/understanding-different-assessment-types/

Pitching Assessm	• IB teachers can target assessment tools in order to suit the spread of learner abilities in a cohort	• IB teachers understand the need to include a spread of difficulty of assessment items in each assessment to distinguish between learner proficiency.	• Targeted teaching • Data led approach to personalised learning • Use of adaptive assessment e.g. SNSA, CATs and similar

		• IB teachers ensure that difficulty tasks enable weaker learners to achieve some success, medium difficulty tasks are pitched at the class average and higher difficulty tasks stretch the ability of the stronger learners.	
Assessing Holistic Skills	• IB teachers' assessment activities call on learners to demonstrate not only skills and knowledge in curricula areas but also attributes in the IB Learner Profile.	• IB teachers have the capacity to develop assessment tasks that enable learners to demonstrate capabilities such as inquiry, communication, openness, integrity, empathy, and reflection. • IB teachers inform their approaches to supporting the growth of Learner Profile attributes among learners by referring to data to indicate strengths and weaknesses.	• KWL strategy (What do you know? What do you want to know? What did you learn?), classroom debates, pushing students to give evidence and to reason by asking 'Why?' (https://www.teachermagazine.com.au/articles/assessing-and-teaching-21st-century-skills)

Assessment identity

	Requirements	Methodology	Possible Resources
Positive Beliefs and Attitudes	• IB teachers have positive beliefs and attitudes about the role that assessment plays in improving learning.	• IB teachers recognise that assessment is a valuable and intrinsic element of good teaching. • IB teachers have internalised the need to incorporate assessment practices into teaching and learning. • IB teachers believe that the use of assessment data can help them become more effective teachers and help learners to achieve better learning outcomes.	• TALIS Report: https://www.oecd.org/berlin/43541655.pdf • Unal, A. & Unal, Z. (2019). An examination of K-12 teachers' assessment beliefs and practices in relation to years of teaching experience https://files.eric.ed.gov/fulltext/EJ1206050.pdf
Assessment Self-Efficacy	• IB teachers have confidence and belief in their assessment skills.	• IB teachers have received sufficient professional learning opportunities to feel that they possess the skills and knowledge of assessment that they need to fulfil their roles. • IB teachers are confident in applying their skills and knowledge of assessment to developing and incorporating a range of targeted assessment activities in their teaching, and to using assessment data.	• Mentoring system for new teachers • Buddy system of teachers trying each other's assessment approaches and providing constructive critique • Strategies for developing and maintaining self-efficacy in teachers https://theeducationhub.org.nz/strategies-for-developing-and-maintaining-self-efficacy-in-teachers/ • Hartell, E. (2017). Teachers' Self-Efficacy in Assessment in Technology Education https://link.springer.com/referenceworkentry/10.1007%2F978-3-319-44687-5_56
Reflecting on Personal Experiences	• IB teachers recognise that their assessment beliefs and practices are conditioned by their personal experiences.	• IB teachers critically reflect on their personal experiences of assessment and the ways in which these influence their assessment practice. • IB teachers evaluate their assessment practices on a regular basis to ensure that they are not allowing preconceptions to undermine their assessment practices	• Barni, D. et al. (2019).Teachers' Self-Efficacy: The Role of Personal Values and Motivations for Teaching https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6640028/ • Assessment Reform Group (2003). The role of teachers in the assessment of learning https://www.nuffieldfoundation.org/sites/default/files/files/The-role-of-teachers-in-the-assessment-of-learning.pdf

Legislative Requirements	• IB teachers are aware of the legislative requirements for assessment in the education system(s) in which they teach and have the skills to ensure that their assessment practices meet these requirements.	• IB teachers review legislative requirements in the education system in which they are working. • IB teachers monitor all their assessment activities to ensure adherence with these requirements.	• Continuous Professional Development (PD) on educational policy and practice through courses, journals and communities - examples include: • Journal of Education Policy https://www.tandfonline.com/toc/tedp20/current • Centre for Education Policy & Practice https://www.acer.org/gb/epp
Cultural Expectations	• IB teachers are aware of the cultural expectations for assessment in the contexts in which they teach and can explain their approaches to assessment in ways that are acceptable to educational stakeholders.	• IB teachers summarise the key cultural expectations about assessment in the context in which they are working. • IB teachers identify appropriate ways to explain assessment strategies to learners, parents and other key stakeholders that give solid reasons for any ways in which these might be regarded as different to expectations.	• Access to the latest research via a dedicated online library resource • In-house training for new and existing teachers on the cultural expectations • Some examples: https://www.cmu.edu/teaching/assessment/basics/alignment.html https://www.ucdenver.edu/faculty_staff/faculty/center-for-faculty-development/Documents/Tutorials/Assessment/module1/course_alignment.htm • https://teachonline.asu.edu/2012/10/aligning-assessments-with-learning-objectives/
Assessment Alignment	• IB teachers reflect on the suggested approaches to assessment in relevant programme guides, subject guides, and support materials, and align their assessment practices with these.	• IB teachers identify the approaches suggested in relevant IB documentation. • IB teachers monitor their assessment practices to ensure that they are in line with these suggestions and to explain any exceptions.	• Use of expert groups i.e. IB teacher Review Groups for quality assurance of assessment documentation

Professional Development

	Requirements	Methodology	Possible Resources
Communities of Practice	• IB teachers have regular opportunities to consult with their colleagues on assessment practices, including assessment design and implementation, and the interpretation and use of assessment data.	• School leaders establish one or more communities of practice around assessment. • School leaders set expectations for teachers around their participation in communities of practice.	• Danielson, C. (2016). *Creating Communities of Practice* https://eric.ed.gov/?id=EJ1100627 • Truscott, D. & Barker, K. (2020). *Developing Teacher Identities as In Situ Teacher Educators through Communities of Practice* https://www.tandfonline.com/doi/abs/10.1080/1547688X.2020.1779890
Support from Colleagues	• IB teachers receive ongoing support and advice from their colleagues on how to enhance their assessment practices, including collaborating on assessment implementation.	• School leaders set expectations and structure to enable peer support for teacher assessment practices. • IB teachers actively participate in supporting colleagues' assessment practices e.g., through partnering on assessment design or intervention, observation of assessment practices in classrooms, etc.	• "[In an outstanding school] *school leaders ensure that opportunities are created for teachers to work together and to learn from each other's practices"* (Masters, G (2012). National School Improvement Tool, p.10). Accessible from https://www.acer.org/files/NSIT.pdf) • Brink, M. & Bartz, D. (2017). *Effective Use of Formative Assessment by High School Teachers* https://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1359&context=pare • Ciampa, K. & Gallagher, T. (2016). *Teacher collaborative inquiry in the context of literacy education: examining the effects on teacher self-efficacy, instructional and assessment practices* https://www.tandfonline.com/doi/abs/10.1080/13540602.2016.1185821

Assessment Specialists	• Schools have identified teachers who have specialist skills and understanding in different elements of assessment and who have ongoing opportunities to share their expertise with their colleagues.	• School leaders ensure that at least one teacher is highly trained and skilled in one or more elements of assessment. • School leaders create structures that enable teachers to consult with assessment specialist colleagues.	• Adie, L., Stobart, G. & Cumming, J. (2019). The construction of the teacher as expert assessor https://www.tandfonline.com/doi/abs/10.1080/1359866X.2019.1633623?journalCode=capj20 • US Department of Education (2012). Enhancing Teaching and Learning through Educational Data Mining and Learning Analytics https://tech.ed.gov/wp-content/uploads/2014/03/edm-la-brief.pdf • Ndukwe, I. & Daniel, B. (2020). Teaching analytics, value and tools for teacher data literacy: a systematic and tripartite approach. https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-020-00201-6
Professional learning	• IB teachers can access professional learning opportunities on specific assessment practices that are tailored to their current skills and understandings and that are available at times and in formats that suit their needs.	• Schools / the IBO make professional learning opportunities on assessment available to all teachers. • Schools / the IBO ensure that these target different elements of assessment and different levels of assessment proficiency.	*"Highly effective principals understand the importance of building their own skills and the skills of colleagues in collecting, analysing, interpreting and using data effectively. They provide access to training and put in place processes such as mentoring and team conversations to build the data literacy levels of staff. They also work to ensure the school infrastructure required to make best use of data, including instruments and systems for collecting, recording, storing, analysing and displaying data. This infrastructure may include assessment resources, survey instruments and electronic systems and processes for capturing, recording and interrogating data".* (Masters, G (2018). Principal Performance Improvement Tool, p.19. Accessible from https://research.acer.edu.au/cgi/viewcontent.cgi?article=1032&context=tll_misc) Victoria Government (nd) *Analysing and Using Data* https://www.education.vic.gov.au/school/teachers/teachingresources/practice/Pages/insight-data.aspx Using Data to Analyse Learning (Coursera Course) https://www.coursera.org/lecture/assessmentforlearning/using-data-to-analyze-learning-yUKav

Up-to-date professional learning	• Professional learning opportunities for teachers are continually updated and revised to remain abreast of best practices in assessment and the availability of new tools and approaches to assessment.	• Schools / the IBO regularly update professional learning opportunities to reflect current practice. • Schools / the IBO offer specific professional learning opportunities on using digital tools for assessment.	• Access to the latest research via dedicated library channel • Monthly newsletter with digested information • Provision of online course and modules in assessment • Northern Ireland Curriculum (nd). Learning, Teaching and Assessment • in the Foundation Stage http://www.nicurriculum.org.uk/docs/assessment/ACCS_Training/foundation/FSGuidanceBooklet.pdf • Future Learn - Assessment for Learning Course https://www.futurelearn.com/courses/introducing-assessment-for-learning

School Environments

	Requirements	Methodology	Possible Resources
Collaboration on Formative Assessment	• School leaders expect teachers to collaborate with each other in formative assessment practices and establish a school climate in which formative assessment is encouraged.	• School leaders encourage the collaboration between teachers on the development and implementation of assessment • School leaders encourage teachers to experiment with new and innovative ways to assess learners.	
Data Teams	• School leaders establish and participate in data teams within schools that analyse assessment data, design interventions and support colleagues to utilise data in informing teaching practices	• School leaders establish teams of teachers to analyse assessment data and support their colleagues. • Specialist teachers can advise colleagues on approaches to the analysis of assessment data, and are able to undertake the analysis of whole-school assessment data in order to draw out insights to	*"[In an outstanding school] a high priority has been given to professional development aimed at building teachers' and leaders' data literacy skills. Staff conversations and language reflect a sophisticated understanding of student assessment and data"*. (Masters, G (2012). National School Improvement Tool, p.5). Accessible from https://www.acer.org/files/NSIT.pdf) Reading and Analysing Data: https://assessment.tki.org.nz/Using-evidence-for-learning/Reading-and-analysing-data

Learner Engagement

	Requirements	Methodology	Possible Resources
Assessment Literacy of Learners	• IB teachers support learners to gain assessment literacy.	• IB teachers support learners to gain the skills and knowledge that they need to monitor their own learning and use assessment data to identify areas to improve. • IB teachers understand the concept of a growth mindset and can model this for learners, encouraging them to overcome set-backs and focus on improvement and deep learning.	• *"[In outstanding schools] teachers encourage and assist students to monitor their own learning and to set goals for future learning" (Masters, G (2012). National School Improvement Tool, p.14). Accessible from https://www.acer.org/files/NSIT.pdf)* • Torshizi, M. & Davari, M. (2019). *I Explain, Therefore I Learn: Improving Students' Assessment Literacy and Deep Learning by Teaching* https://www.sciencedirect.com/science/article/abs/pii/S0191491X18304528
Learner Assessment	• IB learners know learning intentions and success criteria and are involved in designing and implementing assessment.	• IB teachers ensure that learners are fully aware of the learning intentions and success criteria for each class and/or domain. • IB teachers ensure that learners are engaged in designing and implementing assessment, both for use in class, self and per assessment.	• Adie, L & Willis, J. (2015). *Involving students in assessment conversations.* https://www.bera.ac.uk/blog/involving-students-in-assessment-conversations
Self-Assessment	• IB learners regularly undertake self-assessment as a means of enhancing their learning.	• IB learners are confident in using self-assessment activities which have been modelled to them by teachers. • IB learners undertake self-assessment as a regular part of their learning and use the results to inform improvements. • IB learners have the metacognitive and emotional competencies to identify their own strengths and areas for improvement.	• Andrade, H. (2019). *A Critical Review of Research on Student Self-Assessment* https://www.frontiersin.org/articles/10.3389/feduc.2019.00087/full • The Education Hub (nd). *How to successfully introduce self-assessment in your classroom* https://www.theeducationhub.org.nz/wp-content/uploads/2018/03/How-to-successfully-introduce-self-assessment-in-your-classroom.pdf • Assessment for Learning (nd). *Strategies to Enhance Student Self-Assessment*. https://www.assessmentforlearning.edu.au/professional_learning/student_self-assessment/student_strategies_enhance.html

Peer-Assessment	• IB learners regularly engage in peer assessment	• IB teachers guide learners to provide feedback to their peers in a constructive and forward looking way. • IB learners can provide supportive feedback to their peers through discussing the extent to which work meets success criteria. • IB learners provide feedback to their peers which helps them improve their learning.	• TES (2019). *Pedagogy Focus: Peer Assessment*. https://www.tes.com/news/pedagogy-focus-peer-assessment • Topping, K. (2017). *Peer Assessment: Learning by Judging and Discussing the Work of Other Learners* https://discovery.dundee.ac.uk/en/publications/peer-assessment-learning-by-judging-and-discussing-the-work-of-ot • Toolkit for peer-assessment https://www.teachertoolkit.co.uk/2017/05/18/peer-assessment/
Encouraging Data Usage	• IB teachers encourage learners to use assessment data to identify how they can improve.	• IB teachers set expectations for learners to use assessment to identify how to improve, rather than to compete with their peers. • IB teachers require learners to analyse their errors and feedback and to use this to identify how to get better, and model how to do so.	Dyer, K. (2016). Students Can Own Their Data: 5 Ways to Get Started https://www.nwea.org/blog/2016/students-can-data-5-ways-get-started/ •
Providing Feedback on Assessment	• IB teachers share assessment results in a way that informs future improvements.	• IB teachers share actionable feedback on assessment with learners, going beyond the provision of a grade or percentage to identify ways in which learners can enhance their skills or knowledge. • IB teachers share feedback on learner performance with parents and other key stakeholders which focuses on their skills and knowledge and on tangible opportunities to improve these.	• Assessments used as a diagnostic tool to inform teacher judgement • Use of descriptive reports that focus on strengths and weaknesses of individual learner Matters, G. (2006). Using Data to Support Learning in Schools https://research.acer.edu.au/cgi/viewcontent.cgi?article=1004&context=aer

Integration of Digital Assessment

	Requirements	Methodology	Possible Resources

Critical Evaluation of Digital Tools	• IB teachers are equipped to judge the extent to which digital tools will or will not enhance their assessment practices.	• The IBO creates a digital assessment evaluation schema which includes questions such as:
		  • Does this tool achieve my assessment objectives?
		  • Does this tool enable me to assess skills and knowledge more efficiently or effectively than I would be able to do otherwise?
		  • Does this tool evaluate learners' higher order thinking and/or twenty-first century skills?
		  • Does this tool enable learners to apply what they are learning to authentic challenges?
		  • Does this tool facilitate adaptations for learners with additional needs?
		  • Does the tool enable me to track learner progress over time?
			• Training opportunities for teachers in digital skills
			• Mapping of tools available for each assessment
			• Regular piloting of the new innovative digital tools
			• FTV (2016). Assessment experiences in digital technologies in education https://unesdoc.unesco.org/ark:/48223/pf0000247330

Purposeful Selection	• IB teachers are empowered to select digital assessment tools based on their assessment objectives and the enhancements that the digital tools will enable in achieving these.	• IB teachers define assessment objectives for each assessment exercise i.e., what do I want to know? What data will tell me that? • IB teachers evaluate digital tools against these objectives based on the features that the tools offer.	• Up to date repository of digital tools • Review of the previously piloted tools provided • A key expert person nominated for support and guidance
Value Add of Digital Tools	• IB teachers use digital assessments to enhance their assessment practices to differentiate assessment tools and assess learners on complex knowledge and reasoning.	• IB teachers identify the enhancements that digital tools offer in achieving their assessment goals. • IB teachers justify the benefits of using digital tools for enhanced assessment practices.	• Provision of the reviews of tried and tested tools (e.g., EEF https://educationendowmentfoundation.org.uk/) • Regular updates of digital tools repository

Learner Scaffolding	• IB teachers scaffold learners' exposure to digital assessment tools to ensure that they can demonstrate their proficiency through digital tools.	• IB teachers carefully plan and implement scaffolding of skills for digital tools for learners.
		• IB teachers ensure that learners are given ample opportunities to practice using different tools and monitor learner confidence with using these.
			• Across school agreement on the process of scaffolding to include guidance on:
			• e.g.
			  • (1) How to enter responses
			  • (2) How to use digital elements e.g., calculators or spell checkers
			  • (3) How to use more complex elements e.g., graphs
			  • (4) How to create digital outputs e.g., presentations or documents
			  • (5) How to create more complex outputs e.g., animations or complex models
			Drop-in Digital sessions for learners to get practice on using digital tools

Continuity with Teaching	• IB teachers emphasise the use of digital assessment tools where this is a natural continuation of digital approaches to teaching and learning.	• IB teachers make efforts to use digital tools for assessment that are closely aligned with / or integrated with the digital tools used for teaching and learning in particular programme or domain areas. • IB teachers access the training or resources they need to explore the assessment potential of all digital tools that they use in teaching and learning.	• Encourage innovation and exploration of new approaches • Access to conferences on new technologies such as e-Assessment Association (https://www.e-assessment.com/)
Ensuring Accessibility	• IB teachers utilise digital tools for assessment that have either in-built or add-on capacity to accommodate a range of learner needs.	• IB teachers identify the reasonable adjustments required by learners to access digital assessment tools. • IB teachers ensure that digital tools enable these accommodations or identify suitable add-ons that can be used to enable access.	• Training on accessibility • IT support on ensuring digital tools are of the highest recommended standard re accessibility • https://www.w3.org/WAI/ER/tools/

Developing Digital Assessment	• IB teachers can explore and access professional learning opportunities on innovative digital tools for assessment as they become available.	• The IBO creates or adopts professional learning opportunities for teachers to gain skills in developing their own digital assessment tools using innovative tools such as animations, virtual worlds, and simulations. • IB teachers are encouraged to extend existing assessment skills to be able to create innovative and forward-looking assessment tools to enhance their assessment practices.	• E-assessment conferences and seminars such as eAA, AEA and similar • Partner with digital companies to pilot new technologies • Learning how to design online assessments • https://www.ucl.ac.uk/teaching-learning/education-planning-2020-21/planning-your-assessments/designing-effective-online-assessment

Conclusion

Main takeaways

Assessment literacy is a multifaceted concept that refers to teachers' competence in all aspects of assessment. Definitions of assessment literacy have varied over time with changes to the assessment context, including changing accountability systems and an increasing emphasis on formative assessment.

Three core dimensions of assessment literacy are the conceptual (different methods of assessment); the praxeological (the practice of conducting assessment); and the socio-emotional (the social practice of assessment). Overall, assessment literacy can be understood as all aspects relating to teachers' assessment competence, based on theories of assessment, sound practices, socio-cultural understandings and how these are embedded within the educational context.

Having the knowledge and skills in different areas of assessment design is a fundamental requirement for effective teaching and learning. Through measuring learning, teachers are able to quantify and understand their own impact and adjust their teaching to better meet learner needs, hence it is a key part of everyday teaching practice. Regardless of how assessment is used – and whether digital tools are used – teachers need to have a fundamental understanding of assessment literacy in order to be as effective as possible in supporting learners to achieve their potential.

To create successful assessments that can provide high-quality data, teachers need to develop skills in designing learning activities, procedures, and tests. Key elements that teachers need to master include:

- aligning assessment with desired learning outcomes
- using a variety of question types
- pitching assessment appropriately
- using feedback mechanisms
- creating appropriate marking schemes, and
- understanding reasonable adjustments.

This is equally the case for digital and non-digital assessments. In relation to digital assessment, a further key element is to ensure that these only assess learners' IT skills if that is the explicit purpose of the assessment.

In addition, to design assessment tasks, teachers need to have an assessment repertoire that enables them to design the right assessment for the right context, meaning that they need assessment design competency. Many have very little to go on, however. There are more models for good assessment design in some subject areas than in others, and teachers commonly fall back on using published sample assessments for inspiration and as prototypes. Since these tend to be summative in nature, this is not necessarily a good approach.

Using the most suitable type of assessment for learners is important. Formative assessment has come to be regarded as a key element of good teaching, engaging learners in instructional tasks that allow the teacher to uncover levels of understanding and change their teaching approach. It includes elements such as feedback that feeds forward, strategic teacher questioning and learners asking effective questions. Ideally it is frequent, part of an active classroom culture, uses a variety of assessment tasks and involves self and peer assessment.

Despite the benefits of formative assessment, it tends to be inconsistently implemented. Structurally, this is because it requires decentralization of decision-making powers to individual teachers since formative assessment is naturally decentralised.

While formative assessment is empowering for teachers, its implementation can also be difficult in discrete classroom contexts, as any lack of sufficient assessment literacy among teachers, particularly in terms of understanding how formative and summative assessment can work together, has significant consequences. This can be very challenging, especially for less experienced teachers.

This project has provided a good overview of the key literature on teachers' assessment literacy and has provided important insights into critical elements that were included in the assessment literacy and design competency framework. Assessment literacy has evolved significantly over time and continues to evolve now.

While much assessment literacy literature focuses on using assessment, there is much less focus on designing assessment, and the kind of competencies that teachers need to develop. Equally, while digital technologies create new opportunities for assessment, little attention has been paid to how teachers can make the most of digital tools in their assessment practices.

These findings were reflected in the IB documentation reviewed. Analysis of the document review data showed that guidance towards assessment literacy and design competence are spread across all IB programmes, though clearly with more emphasis in some documents than in others. Importantly, it was found that the majority of guidance towards assessment literacy was evident at the continuum- and programme-level documents. This has significant implications for teachers who only use subject-level documents (for example, subject guide and teacher support material), given that the assessment guidance in these documents is largely operational/procedural.

Next steps

This project demonstrates the importance of assessment literacy and design competency for teachers. As

assessments are a significant part of teachers' daily practice, using this framework can assist them in understanding their own impact on learners' achievement, help them to identify learner needs and possible interventions they can use, and provide constructive feedback to learners and their parents. Ultimately, the aim is to enhance teachers' assessment literacy so that they can tailor their own practice and professional development accordingly.

The next stage for this project would be to study how this framework works in practice, across the IB. This means using the framework to inform revisions to programme and subject documentation, expectations for the ways in which schools support teachers and the development of professional learning opportunities for teachers.

The framework needs to be comprehensive and relevant to teachers in all IB programmes. Therefore, it should enable teachers to tailor it according to their needs and to reflect different assessment practices in each programme. Gathering teachers' views on its ease of use, and any potential gaps and omissions, would ensure that the framework is tested and validated for professional use. Equally important is that the framework can identify areas in which teachers already feel confident and those in which they have the greatest desire for professional development.

The expectation is that this framework will add value to different users - not just teachers but also coordinators, school leaders, IB curriculum managers and those designing and facilitating professional development activities. The information provided here also needs to continue to be relevant as assessment becomes increasingly digital. It is therefore necessary to keep the framework an active document, with regular reviews and updates.

As the IB's research into digital assessments shows, the role of teachers is essential in mediating digital approaches and hence the knowledge and skills that teachers develop are of crucial importance (Richardson, 2019). Technological Pedagogical Content Knowledge (TPACK) requires teachers to be able to create interactions between the three bodies of knowledge of pedagogy, content, and technology. Most teachers are unlikely to be able to do this without significant professional learning and this poses a question for the IB on the best way to support teachers.

Finally, this framework will assist the IB when revising their assessment models to ascertain if all the literacies included in this framework are reflected in their documentation. Findings from this project indicate that IB documents already provide guidance towards assessment literacy and design. However, using this framework to help structure assessment guidance across IB programmes will help develop

consistent and transferable professional understandings of assessment literacy.

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Please note: not all literature in this bibliography is referred to in this document - it is included here to provide a comprehensive reading list for those interested in further reading.

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Appendices

Appendix 1: Document scan list of resources

Below is the list of documents reviewed as part of the document scan.

Document type (first column)

1. IB continuum documents (relevant to all programmes)
2. Programme-wide documents
3. Subject-specific documents (compulsory guidance)
4. Subject-specific teacher support materials (TSMs – example guidance)
5. Workshop materials (note that these are labelled as Cat 1/2/3 to indicate IB workshop category)

Type	Programme	Subject/ support area	Title
1	Continuum	All	2020 Programme evaluation FAQs
1	Continuum	All	Assessment principles and practices - Quality assessments in a digital age
1	Continuum	All	Evaluation self-study questionnaire
1	Continuum	All	Guide to programme evaluation
1	Continuum	All	Programme standards and practices
1	Continuum	All	Rules for IB World Schools
2	CP	All	Career-related Programme Frequently asked questions
2	CP	All	CP: From principles into practice
2	CP	All	Overview of the Career-related Programme
2	CP	Assessment	CP Assessment Procedures 2021
2	DP	All	Diploma Programme Grade descriptors
2	DP	All	DP Grade descriptors
2	DP	All	Teaching and Learning informed by assessment in the DP - Guide and TSM DRAFT UNPUBLISHED
2	DP	Assessment	DP assessment: Principles and practice
2	MYP	All	Further guidance for developing MYP assessed curriculum
2	MYP	All	General regulations: Middle Years Programme
2	MYP	All	MYP assessment procedures 2021
2	MYP	All	MYP Coordinator's notes May2020
2	MYP	All	MYP eAssessment development report
2	MYP	All	MYP ePortfolio user guide
2	MYP	All	MYP: From principles into practice
2	MYP	All	The conduct of IB MYP on-screen examinations
2	MYP	All	The IB MYP Final Statistical Bulletin M2019 examination session
2	PYP	All	General regulations: Primary Years Programme
2	PYP	All	Learning and teaching
2	PYP	All	PYP Subject Guidance Review

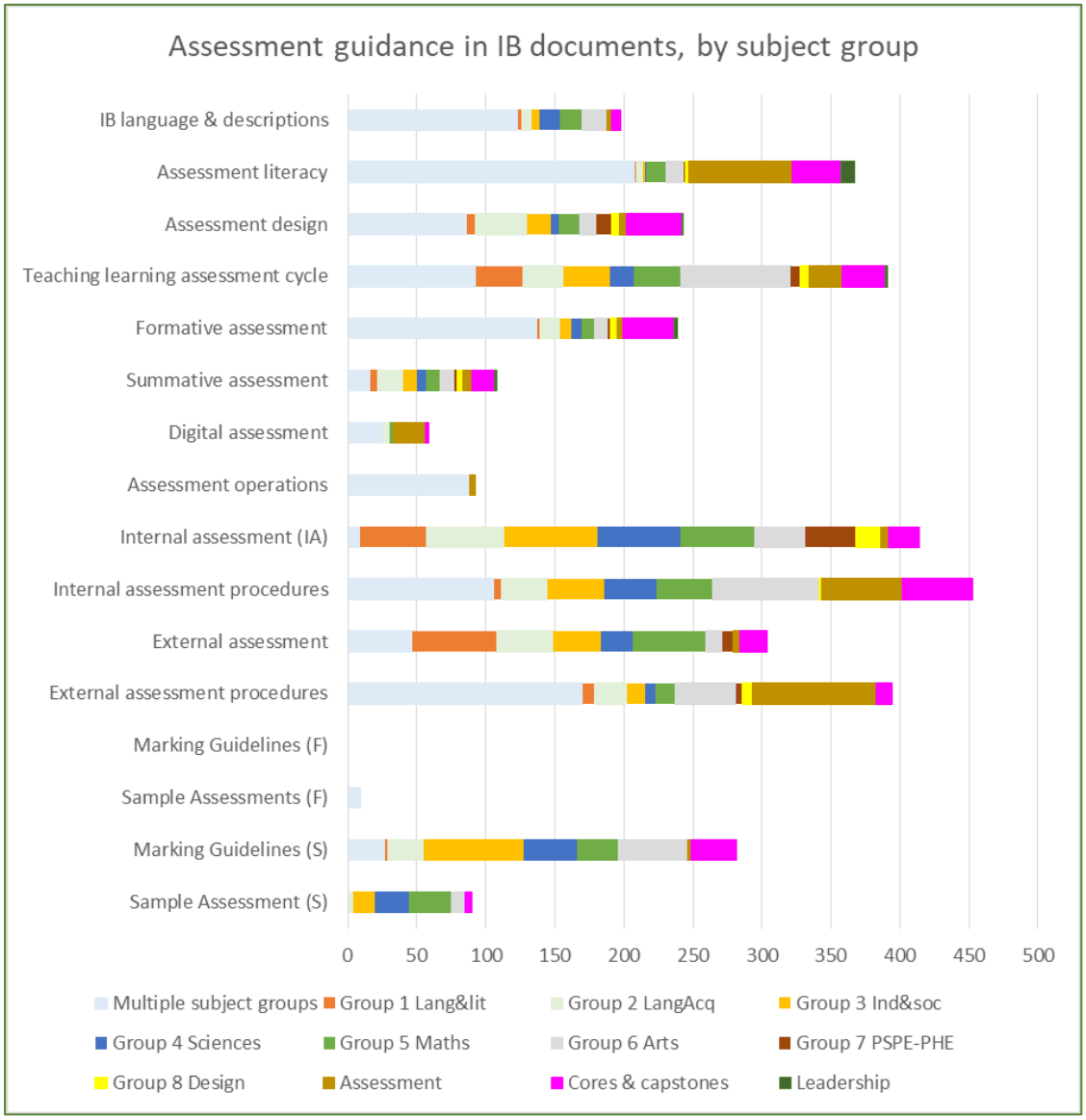
2	PYP	All	The learner
2	PYP	All	The learning community
2	PYP	All	The PYP as a model of transdisciplinary learning
2	PYP	All	Unit of Inquiry Planner template
3	CP	Cores & capstones	CP Personal and Professional Skills guide
3	CP	Cores & capstones	CP Reflective Project guide
3	DP	Cores & capstones	DP Creativity Activity Service guide
3	DP	Cores & capstones	DP Theory of knowledge guide
3	DP	Group 1	DP Language A: Language guide
3	DP	Group 2	DP Language ab initio guide
3	DP	Group 2	DP Language acquisition examination user guide: listening
3	DP	Group 2	DP Language acquisition examinations user guide: comprehension
3	DP	Group 2	DP Language B guide
3	DP	Group 3	DP Economics guide
3	DP	Group 3	DP History guide
3	DP	Group 3	DP Psychology guide
3	DP	Group 4	DP Computer science guide
3	DP	Group 4	DP Physics guide
3	DP	Group 4	DP Sport, Exercise and Health Science guide
3	DP	Group 5	DP Mathematics: analysis and approaches guide
3	DP	Group 5	DP Mathematics: Applications and interpretations guide
3	DP	Group 6	DP Film guide
3	DP	Group 6	DP Music guide
3	DP	Group 6	DP Visual Arts guide
3	MYP	Cores & capstones	Fostering interdisciplinary teaching and learning in the MYP
3	MYP	Cores & capstones	Further guidance for MYP projects
3	MYP	Cores & capstones	MYP Interdisciplinary learning report 2020
3	MYP	Group 1	MYP Language and literature guide
3	MYP	Group 2	Further guidance for MYP languages
3	MYP	Group 2	MYP Classical languages guide
3	MYP	Group 2	MYP Language acquisition FAQs
3	MYP	Group 2	MYP Language acquisition guide
3	MYP	Group 3	Further guidance for MYP individuals and societies
3	MYP	Group 3	Global context for the Nov2019 MYP eAssessments, individuals and societies
3	MYP	Group 3	MYP Individuals and societies guide
3	MYP	Group 4	MYP Sciences guide
3	MYP	Group 5	Further guidance for MYP mathematics and sciences
3	MYP	Group 5	MYP Mathematics guide
3	MYP	Group 6	Further guidance for Arts
3	MYP	Group 6	MYP Arts curriculum development report 2020
3	MYP	Group 6	MYP Arts guide

3	MYP	Group 7 PSPE-PHE	Further guidance for MYP physical and health education
3	MYP	Group 7 PSPE-PHE	MYP Physical and health education guide
3	MYP	Group 8 Design	MYP Design guide
3	PYP	Group 1	PYP language scope and sequence
3	PYP	Group 3	PYP social studies scope and sequence
3	PYP	Group 4	PYP sciences scope and sequence
3	PYP	Group 5	PYP mathematics scope and sequence
3	PYP	Group 6	PYP Arts scope and sequence
3	PYP	Group 7 PSPE-PHE	PYP personal, social and physical education scope and sequence
4	DP	All	DP TSM Sample Unit Plan
4	DP	Cores & capstones	DP Theory of Knowledge TSM
4	DP	Cores & capstones	DP Theory of Knowledge TSM Assessed student work
4	DP	Cores & capstones	DP Theory of Knowledge TSM Specimen examination
4	DP	Group 1	DP Language A TSM
4	DP	Group 1	DP Language A TSM Subject Map
4	DP	Group 2	DP Language ab initio TSM
4	DP	Group 2	DP Language acquisition TSM examination rubrics
4	DP	Group 2	DP Language B TSM
4	DP	Group 3	DP Economics TSM
4	DP	Group 3	DP Economics TSM Student Assessed Work
4	DP	Group 3	DP History TSM Approaches to learning
4	DP	Group 3	DP History TSM Approaches to teaching
4	DP	Group 3	DP History TSM Internal assessment
4	DP	Group 3	DP History TSM Sample Examination
4	DP	Group 3	DP History TSM Sample EA
4	DP	Group 3	DP History TSM Sample IA
4	DP	Group 3	DP Psychology TSM IA
4	DP	Group 3	DP Psychology TSM IA marking
4	DP	Group 3	DP Psychology TSM Sample paper
4	DP	Group 3	DP Psychology TSM Sample student work
4	DP	Group 4	DP Computer science TSM Annotated student work
4	DP	Group 4	DP Computer science TSM IA
4	DP	Group 4	DP Physics TSM FAQ
4	DP	Group 4	DP Physics TSM IA marking criteria
4	DP	Group 4	DP Physics TSM sample work
4	DP	Group 4	DP Physics TSM Specimen examination
4	DP	Group 4	DP Sport Exercise Health Science TSM IA Overview
4	DP	Group 4	DP Sport Exercise Health Sciences TSM annotated student work
4	DP	Group 5	DP Mathematics: Analysis and Approaches TSM
4	DP	Group 5	DP Mathematics: analysis and approaches TSM Assessed Student work
4	DP	Group 5	DP Mathematics: Applications and interpretations TSM

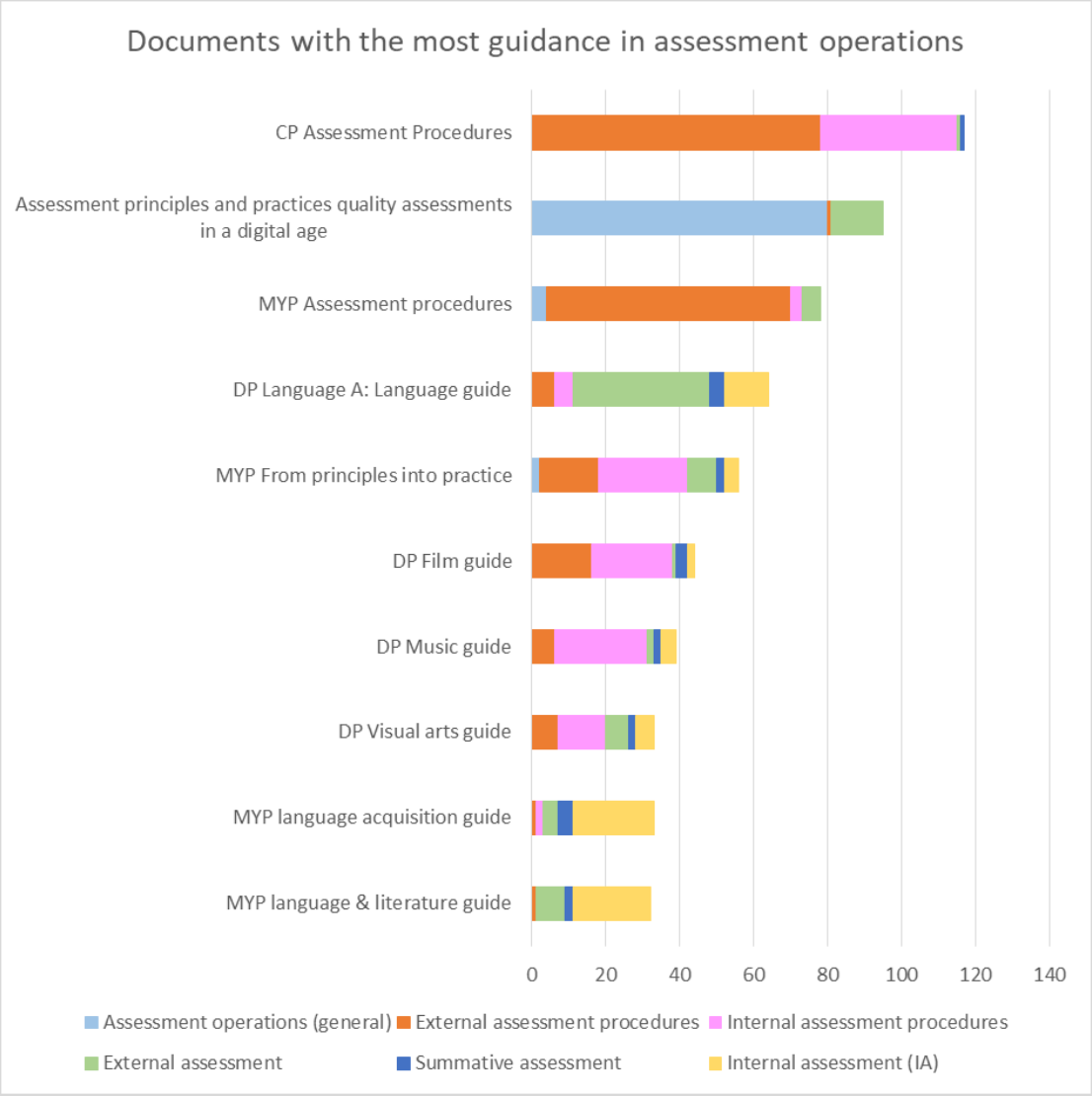
4	DP	Group 6	DP Film TSM
4	DP	Group 6	DP Music TSM
4	DP	Group 6	DP Visual arts TSM Comparative study
4	DP	Group 6	DP Visual arts TSM exhibition
4	DP	Group 6	DP Visual arts TSM Process Portfolio
4	MYP	All	MYP eAssessment Q&A sheet
4	MYP	All	MYP on-screen examinations FAQs
4	MYP	All	MYP Supporting guidance for N20
4	MYP	Cores & capstones	Evaluating MYP interdisciplinary unit plans
4	MYP	Cores & capstones	MYP Interdisciplinary unit planner template
4	MYP	Cores & capstones	MYP Projects subject report Nov19
4	MYP	Group 2	Language acquisition teacher support material
4	MYP	Group 2	Partially complete MYP unit plan: Language acquisition English-Chinese Nov2019
4	MYP	Group 3	MYP Markscheme Nov2019 Integrated humanities
4	PYP	All	PYP Developing a programme of inquiry
4	PYP	All	PYP Inquiry in a primary setting
4	PYP	Cores & capstones	PYP Approaches to learning
5	Continuum	Cores & capstones	Cat 3 Approaches to learning - Guidelines and planner
5	Continuum	Leadership	Cat 3 Leading for Effective Teaching & Learning - Agenda
5	Continuum	Leadership	Cat 3 Leading for Effective Teaching & Learning - Extra resource
5	Continuum	Leadership	Cat 3 Learning diversity & inclusion - Guidelines & planner
5	CP	Cores & capstones	Cat 1 Reflective project - Planner Feb 2018
5	CP	Cores & capstones	Cat 2 Personal & Professional skills - Planner (Sept 2018)
5	CP	Cores & capstones	Cat 2 Reflective project - Planner (Sept 2018)
5	DP	Cores & capstones	Cat 1 TOK - Global session guidelines & planner
5	DP	Cores & capstones	Cat 2 TOK - Global session guidelines & planner
5	DP	Cores & capstones	Cat 3 EE in focus guidelines & planner
5	DP	Cores & capstones	Cat 3 TOK for subject teachers - Global session guidelines & planner
5	DP	Cores & capstones	Cat 3 TOK Helping students write strong essays - Guidelines & Planner
5	DP	Group 2	Cat 1 Language B - Global session guidelines & planner 2018
5	DP	Group 2	Cat 2 Language B Planner Feb 2018
5	DP	Group 2	Cat 3 Language B building thematic units planner Jan 2018
5	DP	Group 3	Cat 1 History - Global session guidelines & planner
5	DP	Group 3	Cat 2 History - Global session guidelines & planner
5	DP	Group 3	Cat 3 History IA - Global session guidelines & planner (July 2018)
5	DP	Group 5	Cat 1 Mathematics Analysis and approaches - Planner
5	DP	Group 5	Cat 2 Mathematics Analysis and approaches - Planner
5	DP	Group 5	Cat 3 Mathematics a focus on IA - Planner

5	MYP	All	Cat 1 supplementary components
5	MYP	All	Cat 1&2 FAQs
5	MYP	All	Cat 2 Reflecting on unit planning
5	MYP	All	Cat 2 Supplementary components
5	MYP	All	Cat 3 Creating authentic units - Guidelines & planner
5	MYP	Assessment	Cat 3 Internal standardisation activity
5	MYP	Assessment	Cat 3 Managing assessment MYP - Guidelines & planner
5	MYP	Assessment	Cat 3 Power & impact of digital assessment - eAssessment reflection
5	MYP	Assessment	Cat 3 Power & impact of digital assessment - Guidelines & planner
5	MYP	Cores & capstones	Cat 3 Building self-directed learners through ATL - Guidelines & planner
5	MYP	Cores & capstones	Cat 3 Building self-directed learners through ATL - workbook
5	MYP	Cores & capstones	Cat 3 Interdisciplinary - Guidelines & planner
5	MYP	Group 2	Cat 1 Language acquisition F2F curriculum framework
5	MYP	Group 2	Cat 1 Language acquisition progressions
5	MYP	Group 2	Cat 1 Language acquisition progressions appendix
5	MYP	Group 2	Cat 2 Language acquisition F2F curriculum framework
5	MYP	Group 2	Cat 2 Language acquisition task specific clarifications
5	MYP	Group 2	Cat 2 Language acquisition unit plan
5	MYP	Group 3	Cat 2 Individuals and societies task specific clarifications
5	MYP	Group 3	Cat 2 Individuals and societies unit plan
5	MYP	Group 5	Cat 1 Mathematics F2F curriculum framework
5	MYP	Group 5	Cat 2 Mathematics F2F curriculum framework
5	MYP	Group 5	Cat 2 Mathematics task specific clarifications
5	MYP	Group 5	Cat 2 Mathematics unit plan
5	MYP	Group 5	Cat 3 Mathematics and the CCSS - Guidelines and planning
5	MYP	Group 8 Design	Cat 2 Design task specific clarifications
5	MYP	Group 8 Design	Cat 2 Design unit plan
5	PYP	Assessment	Cat 2 Evidencing learning - Session guidelines & planner
5	PYP	Group 1	Cat 3 The role of language
5	PYP	Group 5	Cat 3 The role of mathematics
5	PYP	Group 6	Cat 3 The role of the arts
5	PYP	Group 7 PSPE-PHE	Cat 3 The role of PE
5	PYP	Leadership	Cat 1 Leading the learning in PYP schools - Session guidelines and planner

Appendix 2: Assessment Guidance by Subject Group



Appendix 3: Assessment Operations Guidance by Documents



Appendix 4: Document Scan Codebook

Code	Description	Example
Digital Assessment	Explicit reference to or description of online, e or digital assessment tasks, processes, policies or procedures	*• The eAssessment revolution• eAssessment and current research*
Assessment Literacy	Theoretical or practical assumptions that underpin assessment (reliability, bias inclusivity etc.)- what teachers need to know and be able to do to be assessment literate	*What evidence will we gather about students' emerging knowledge, conceptual understandings and skills? How are we monitoring and documenting learning against learning goals and success criteria? How are we using ongoing assessment to inform planning, and the grouping and regrouping of students?*
Assessment Operations	Roles, actions, procedures or policies relating to external or internal assessment in the IB program	
> External Assessment Procedures	Roles, actions, procedures or policies relating to external assessment	*In the event that a moderator cannot be found to moderate a school's personal projects in a special request language, it may be possible to align the marking of the special request language with the marking of a core language so that a common moderation adjustment can be applied. Information regarding the following factors will be requested, to help determine whether a school's special request language can be aligned to a core language. •The teachers of the two languages must be able to standardize their marking in a common language (usually the core language) to ensure the same marking standard has been applied to all candidates submitting personal projects in those languages. •The core language must be a majority language for the personal project in the school, to help ensure a stable moderation factor. •The core language cohort must contain candidates of a similar ability to the special request language cohort, meaning that there will be a similar range of marks for both groups of candidates. •There must be at least 21 candidates completing their personal project in the core language. If there is no core language with at least 21 candidates, the ratio of core language candidates to special request language candidates must be at least 5:1.*
>Internal Assessment Procedures	Roles, actions, procedures or policies relating to internal assessment	*PYP requirements a. Assessment at the school is integral with planning, teaching and learning. b. Assessment addresses all the essential elements of the programme. c. The school provides evidence of student learning over time across the curriculum.*

>IB Language and Descriptors	Language, policies and descriptions relating to IB, IB Programs or assessment procedures	*Seed*A seed is a script that has already been marked by the principal examiner and is randomly added to a batch of scripts allocated to an examiner for marking. It looks like any other script, so the examiner cannot tell it is a seed. The marks the examiner awards the seed will be checked against those given by the principal examiner, with a certain tolerance to check the examiner is marking to the set standard. Dynamic sampling moderation seeds are used in the same way as part of the moderation process.*
Assessment Design	Theoretical or practical considerations or actions relating to selection, design or creation of assessment	*Assessment carried out in an international context has additional challenges in terms of equity, above those normally encountered within a national system. Questions that might be perfectly appropriate in one national setting become inappropriate in another. Questions referring to sports, travel, entertainment, historical events, even the weather, must be prepared very carefully. It might seem that the only way around this problem is to prepare examination questions devoid of all but a lowest common denominator of sociocultural context. However, to do so would not only make examination questions very limited and dull, it would also be against the whole philosophy of DP assessment and against good assessment practice in terms of ensuring validity through context-based tasks. Contextualized work and assessment are vital to good learning. There are two possible ways around this dilemma. First, background contextual information can be provided to students, through specification in the subject syllabus content, by providing case studies on which questions are based, or even in the examination question itself (as long as this is not too lengthy and thus distracting from the purpose of the assessment). A second method is to utilize more open-ended assessment questions and tasks that allow students to select their own context in which to respond.*
Formative Assessment	Explicit reference to formative or classroom assessment	*Formative assessment encompasses "all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged." (Black and Wiliam 1998: 7) Formative assessment is therefore a tool or process that teachers can use to improve student learning; it is about assessment for learning, rather than simply assessment of learning.*
>Marking Guidelines (F)	Marking annotations, guides or moderation examples and procedures for formative assessment	No codes found
>Sample Assessments (F)	Samples or descriptions of assessment tasks or student work	*An example of a digital formative assessment: Subject: Spanish B In the language acquisition class, not only do students learn about digital texts such as blogs as a new genre of text, they also engage with these digital texts directly in formative assessments and peer feedback. In this*

	that is related to formative assessment	*class, students were asked to write a blogpost related to the cultural identity of an island located in Perú, attending to the text type, organization of paragraphs, cohesive devices and the positive and negative aspects related to the effects of tourism and the theme "identities". The teacher explained that the use of an interactive blog format allowed his students and him to provide instant feedback and recommendations to one another and to make revisions at the same time. This allowed him to assess elements that are hard to assess on a paper and pencil task, such as students' ability to interact with one another and to respond to feedback immediately. Example contributed by Emeli Ward, NIST International School (Bangkok)*
Summative Assessment	Explicit reference to summative, graded or marked assessment	
>Internal Assessment (IA)	Descriptions of or references to summative assessment that is marked internally	*Introductions and essential understandings The Diploma Programme (DP) requires all disciplines to have an internal assessment (IA) component. • To create an atmosphere in which every participant feels confident to actively comment and ask questions • To explore where each participant stands with regard to having an IA component in mathematics • To identify how and where the IA addresses aims and assessment objectives of mathematics 2. Aligning teaching for inquiry learning The exploration is an important component of the mathematics curriculum with specific learning outcomes. • To understand that 10–15 hours that are allotted to the "mathematics toolkit" are dedicated to the IA process • To have a common understanding of collaboration in mathematics • To recognize what collaboration is allowed between students throughout the IA process 3. Planning the IA process Teachers are responsible for creating a timeline that allows students to achieve top levels in the IA. An appropriate timeline will allow students to achieve goals that are • To recognize the need to introduce the exploration as early as possible • To understand that although the IA is introduced early the actual process (timeline) should only start once enough content is covered*
>External Assessment	Descriptions of or references to summative assessment that is marked externally	*MYP on-screen examinations are constructed as a series of tasks that sample, simulate or replicate internal assessment practices. The assessments follow an agreed structure that provides a clear framework for developing each examination. In light of lessons learned from the May and November 2016 sessions, the following changes are proposed to these examination blueprints. For first examinations in May 2017 Mathematics blueprint only The mark total for the mathematics examinations will be reduced from 120 to 100 marks. The structure of the final task has also been changed so that only one investigation will be required rather than two. This will improve the accessibility of the investigation task and reduce the overall content of the examination.*

>Sample Assessment	Sample exams, assessment tasks or student work that is related to summative assessment	*Psychology Standard level Paper 1© International Baccalaureate Organization 20162 pages Instructions to candidates ☐ Do not turn over this examination paper until instructed to do so. ☐ Section A: answer all the questions. ☐ Section B: answer one question. ☐ The maximum mark for this examination paper is [49 marks].*
>Marking Guidelines	Marking rubrics, instruments, annotations, guides or moderation examples and procedures for summative assessments	*8. Marking the Reflective Project There is a standard marking practice, utilizing written descriptors to measure student performance which the IB externally moderates. • To make clear how the word limit criteria should be applied in marking RPs. • To analyse exemplar reflective projects in relation to the mark scheme and discuss application of assessment criteria. • To showcase the marking of exemplar reflective projects and discuss how 'characteristics of performance' help refine grading.*
Teaching-Learning-Assessment Cycle	Assessment embedded in or related to the teaching learning cycle	*How are the attributes of the learner profile connected to learning? For example, how do the attributes connect to learning goals, action, self-assessment, and so on? •Is there a relevant connection, wherever possible, between the learner profile attributes, the skills being developed in a unit and the assessment tasks?*