



TEACHERS' ASSESSMENT LITERACIES AND PRACTICES: DEVELOPING A PROFESSIONAL COMPETENCY AND LEARNING FRAMEWORK

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There is worldwide interest in helping educators from all sectors to enhance their assessment practices. In particular, researchers and policy-makers are advocating new literacies of assessment that will fully explore its formative functions for teachers and students. Supporting educators on learning and changing assessment practices is a logical “next step” to ensure that administrative, curriculum and assessment innovations can keep pace with each other, according to twenty-first-century aspirations. Assessment-competent educators understand the importance of aligning a range of valued achievement targets with the appropriate assessment practices for sustainable and life-long learning of students. This paper documents how a team of educators from the National Institute of Education, Singapore has developed an assessment competency and professional learning framework for all student and experienced teachers in all Singapore primary and secondary schools and junior colleges. The paper also discusses the deliberations and impacts of the framework that have resulted in a series of emerging professional learning courses and insights on assessment.

Keywords: *Assessment literacy, assessment practice, assessment competency, professional learning*

INTRODUCTION

In recent years, there has been growing interest in raising teachers' literacies and practices in aligning teaching, learning and assessment that is consistent with twenty-first-century educational aspirations. Educational authorities and policy-makers have increasingly acknowledged that quality improvements in new standards for teaching and learning are unlikely unless assessment keeps pace with changes and is recognised as an integral part of the learning experience ([Birenbaum, 2012](#); [Hargreaves, Earl & Schmidt, 2002](#)). Consequently, there is a need for teachers to broaden the definition of assessment and its role in all classroom-teaching contexts. Many researchers have argued, for instance, for a shift away from narrowly “measuring” learning in tests and examinations towards assessment forms that are broadly and explicitly designed to “promote learning as a meaning-making process” ([Buhagiar, 2007, p. 39](#)). According to Hargreaves et al. ([2002, p. 70](#)), more authentic assessment approaches, as opposed to traditional paper-pencil techniques, motivate students to take more responsibility for their learning and stimulate their abilities to apply learning to a wide range of knowledge, rather than “acts of memorisation and basic skill development”. An *assessment-literate* teacher understands and is sensitive to such student developmental pathways, which is demonstrated along a number of dimensions in their *assessment practices*: (1) what students know and can do, (2) how they think and learn, and (3) the knowledge and skills to differentiate teaching to address the developmental levels and learning needs of individual students ([Darling-Hammond & Baratz-Snowden, 2005](#)). To develop fully this sophisticated expertise, teacher training programmes and professional development in schools and institutions play an important role in emphasising and investing in improving teachers' assessment

literacies and practices ([Alonzo, Lee & Davison, 2015](#); [Fullan, 2001](#); [Price, Rust, O'Donovan & Handley, 2012](#); [Stiggins, 2000](#)). This is particularly important as it has been widely reported that the assessment training that student teachers have received, do not prepare them for the difficult assessment decisions they have to make in actual classrooms ([Mertler, 2009](#)). On the other hand, we have findings of trained teacher's professional learning in schools as being brief, politically imposed, ill-designed and pedagogically naive, leaving them more cynical and no more knowledgeable nor skilled than before ([Guskey, 2001](#)). This is a far cry from the calls for professional learning to be responsive to how individual teachers learn, and have more influence on their classroom practices.

This paper documents the work of a team of teacher educators in the National Institute of Education (NIE), Singapore and Ministry of Education (MOE), Singapore, who have come together to develop a professional learning framework on assessment for both student and experienced teachers. The work forms part of a coordinated effort of different teams of teacher educators within the NIE and MOE to develop a teacher education model for the twenty-first century.¹ The rationale is that the team recognises there is a need to assist all teachers (including student teachers) to be not intimidated by the challenging classroom assessment work – how the polygamous principles of assessment (“why, what, how and when assessment”) can actually be integrated and enacted within the whole spectrum of teaching and learning. The team also anticipates there should be a systematic form of professional learning to help all teachers to learn about sound assessment practices. The documentation of this work is significant for students and educators in *all* sectors to understand what are effective assessment in classrooms, what can potentially go wrong with assessment, and how to enact good assessment practices. The team started in 2008 by surveying the relevant literature on raising the quality of teachers' assessment literacy and practices, summarised in the first part of the paper. Second, an audit and survey of the assessment practices and assessment literacies was conducted in 2009–2010. With the findings of the audit and survey (reported in the second part of the paper), this led to the development of an assessment competency and learning framework for all MOE and NIE teachers in 2011–2012. The final part of the paper discusses the deliberations and impacts of the findings that have resulted in a series of professional learning programmes and courses on assessment from 2012–2013 to the present.

TEACHERS' ASSESSMENT LITERACIES AND PRACTICES

Assessment is a widespread, if not intrinsic, feature of most education systems, schools and classrooms. Teachers can spend approximately 10 to 50 per cent of their work time on assessment-related activities ([MacBeath & Galton, 2004](#)). With so much time and other resources devoted to assessment, it is critical to understand what teachers know about assessment and the resulting practices that are created based on the decision-making process. Furthermore, it is necessary for teachers to move from a passive interpretation to an active application of a variety of assessment data that will impact teaching and learning. Typically, when teachers wait for tests and examination results to be known to them, it is too late to help their students through follow-up teaching and

¹ For more information about this, see <http://www.nie.edu.sg/about-nie/teacher-education-21>.

learning activities. When teachers are able to communicate clearly and objectively the different processes and outcomes of assessment in their lessons in a timely fashion, students can benefit from insights through their self-regulation of learning in an expedient way. However, because lessons are such fast-moving, complex and unpredictable occasions, there may be all sorts of reasons why students lag behind, or do not conform to the expectations of a particular context of a teacher's lesson planning and execution. Frequently, the reasons why the observed responses and behaviours are so different from those anticipated by a teacher lie in an over- or under-emphasis on assessment of students' progress in learning (e.g., overly distracted by one mistake made by a student), and rushing for "coverage" of lessons, leading to all kinds of unintended consequences for the students. An expert teacher, on the other hand, can distinguish insightfully between important and unimportant information in a complex situation of classroom interaction, reasoning accurately and instantaneously about what they observe, and can use this analysis to make more informed teaching decisions ([Berliner, 2001](#)). This constitutes a high quality of assessment literacies and professional learning of assessment practices that are desirable in a teacher.

Various international research findings have highlighted the need to help teachers acquire different assessment literacies and practices (e.g., [Bryk, Nagaoka & Newmann, 2000](#); [Clare & Aschbacher, 2001](#); [Koh & Luke, 2009](#)). These studies cite findings that teachers are not equipped to carry out successful assessment informally or formally as a result of knowing a limited set of assessment practices ([Chen, 2005](#); [Cizek, Fitzgerald & Rachor, 1995](#); [Impara, Plake & Fager, 1993](#); [Mertler, 2003](#); [Volante & Fazio, 2007](#)). There are also positive reports of findings. Newmann, Bryk and Nagaoka ([2001](#)) found that even in disadvantaged Chicago classrooms, students benefit from teachers' high level of assessment literacies through learning to design and introduce appropriately pitched assessment tasks, leading to students demonstrating a complex intellectual performance. Stiggins ([2004](#)) posits five main features that teacher educators and professional development providers need urgently to take into consideration regarding what assessment literacies constitute:

1. Assessments must go beyond merely providing scores and corresponding judgements about student learning.
2. They must provide rich descriptions of the current state of student achievement. In other words, if assessments are to support improvements in student learning, their results must inform students how to do better next time.
3. Formative communication must transmit sufficient, understandable detail to guide the learner's actions. In such contexts, single scores or grades will not suffice.
4. Evolve in an ongoing, interconnected series so that patterns in student learning will be revealed.
5. They must have balanced assessment systems that serve diverse purposes by meeting the information needs of all decision-makers – school leaders, teachers and students.

Questions need to be raised about whether teacher educators and professional development providers have these literacies and make use of and model a range of assessment practices – in both formative (assessment *for* learning) and summative (assessment *of* learning) orientations; whether they actually, for instance, provide timely feedback and model effective assessment practices to enhance student and experienced teachers' learning in constructive and developmentally appropriate ways. Earlier, questions were asked of whether teacher educators and professional development providers were indeed helping teachers to meet the required standards

of (a) accurately assessing the achievement of the students, (b) communicating assessment results effectively to benefit the students, and (c) using assessment to make the teaching and learning process more effective ([Soled, 1995](#)). Such questions challenge the view that the building capacity and requisite assessment of the professional knowledge and skills of teacher educators are already an integral part of teacher preparation (also known in this paper as pre-service) and in-service programmes ([Stiggins, 2006](#)).

Reports on nationwide attempts to raise the quality of teachers' assessment literacies and practices have on the whole been positive. In Darling-Hammond and Atkin's ([2008](#)) longitudinal study on the impact of the National Board Certification (NBC) process in the USA on teachers' assessment practices, it was found that the teachers' certification process has strong correlations with teachers' motivations to engage in assessment strategies that support student learning in their classrooms. In particular, teachers were found to show changes in the variety of assessments they used and how they used the assessment information to support student learning. In Sato, Wei and Darling-Hammond's ([2008](#)) longitudinal study on the impact of professional certification training on assessment literacies, teachers were found to show changes in the variety of their assessment practices that were aligned with a broader set of learning outcomes for various subjects, not just towards performance goals.

Other studies also suggest that assessment practices are among the key aspects of pedagogy that teachers identify as undergoing change as a result of the NBC process (e.g., [Sato et al., 2008](#); [Lustick & Sykes, 2006](#)). Importantly, professional teacher education programmes provide the initial grounding for student teachers to acquire a broad repertoire of "best practices" in assessment to create and adapt effective assessments in teaching to improve students' learning. Reflecting this initiative, "teaching, learning, and assessment must be viewed as interactive and cyclical by candidates" ([Darling-Hammond & Baratz-Snowden, 2005, p. 23](#)) even beyond teacher preparation. Teacher education programmes need to consider the tripartite relationship between teaching, learning and assessment critically for enhancing teachers' professional knowledge throughout their teaching career. Chittenden and Jones identified five components of the teacher education experience that seemed critical to this cause:

1. a framework that provides a vision of good teaching and has heuristic value for critical analysis;
2. understanding of formative and summative assessments with common criteria of good assessment practices that introduce a degree of accountability for different orientations and purposes;
3. a process for grounding the abstractions from the framework in the realities and evidence from daily classroom life through documentation;
4. systematic work with colleagues through collaboration; and
5. allocating specific time for regular meetings with colleagues to keep the demanding process on the teachers' agenda despite the ongoing pressures and demands of teaching. ([1997, pp. 16–17](#))

The call for teachers to be more assessment literate ([Alonzo et al., 2015](#); [Mertler, 2009](#); [Mertler & Campbell, 2005](#); [Stiggins, 1991](#)) assumes that it is possible and important to identify, categorise and teach a distinctive body of knowledge of "assessment" that teachers need to know and can

draw upon as their classroom practices. However, some studies have concluded that teacher-training programmes typically do not include adequate professional training programmes in systematic assessment literacies and demonstration of good assessment practices ([Shepard, 1989](#); [Stiggins, 2006](#)). In the English schools' context, while there was general acceptance that assessment innovation and updating were desirable after different forms of professional learning sessions were introduced, it was also felt that there was no detailed conceptualisation or critical evaluation beyond how its potential benefits were more or less taken for granted ([Gardner, 2010](#)). In particular, there were few opportunities to tailor learning experiences to enable teachers to engage within the classroom context of their own needs.

On balance, I would argue that professional teacher-education programmes *must* provide an initial grounding for all teachers to reflect broadly on how teaching, learning *and* assessment be viewed as interactive and iterative throughout their professional careers. In view of the dominance of the examination/testing-oriented approaches of teaching and learning in Asian schools, it is the deeper-learning potential of assessment literacies and practices that is probably most in need of further work or clarification. However, like most categories of professional knowledge, arguably they cannot be thought of as just a stable and uncontested body of pre-existing knowledge that teachers should know and simply “download” occasionally, but rather knowledge that has to be deliberated, contextualised and constructed by teachers in their daily practice, co-existing with what they already know about teaching and learning. While identifying such a body of professional knowledge formally can provide a useful starting-point and even roadmap for improving teachers' assessment practices, the actual knowledge used can be highly personal and integrated and transformed by other knowledge in different circumstances and classroom contexts.

SINGAPOREAN SCHOOL CONTEXT

In 2008, the Primary Education Review and Implementation (PERI), led by Grace Fu who was the incumbent Minister of State for Education at the time, was formed to study ways to enhance primary education in the context of the *Teach Less, Learn More* (TLLM) initiative. At the same time, an Assessment Review Committee within the MOE was convened to review and explore ways to refine the examination and assessment landscape in Singaporean schools. The PERI Committee recognised that while the high-stakes nature of national examinations could have unintended consequences for teaching and learning, such as narrowing of the curriculum and teaching and focusing only on a small set of limited learning outcomes, examinations continue to play an important role in Singapore's education system. The Assessment Review Committee shared a similar view, in that rather than revamping the national examination system at this point, schools and teachers could take measured steps to build up capacity for school-based assessment, which could better complement the national examinations, providing students with a more comprehensive learning experience. The recommendations for changes in assessment beyond lower primary proposed by MOE involved helping schools and teachers to think about the possibilities of “balanced assessment”, involving the use of practices that continue to support students achieve high academic standards while broadening their learning opportunities. While recognising the many strengths of that system, MOE reported recommendations that addressed four broad themes:

- Balancing assessment of learning with assessment for learning
- Rebalancing learning of content knowledge and development of skills
- Developing intrinsic motivation through excellence against defined standards
- Building the capacity of schools and the MOE in assessment literacy

With the national reforms and research agenda worldwide and within Singapore, one of the most important areas requiring theoretical analysis and empirical research is teachers' education on assessment. New initiatives in the education of teachers on assessment literacies and new roles in professional assessment practices demand diverse and authentic means to assess both their learning and performance. A panel of teacher educators in the NIE, of which I was a member, was formed in 2008–2009, with the following terms of reference and deliverables:

- Review and synthesise the existing knowledge and research in teacher education in assessment, as well as present a new inquiry stance to extend and deepen this knowledge.
- Review existing assessment practices in initial teacher preparation and professional development programmes in the NIE.
- Identify areas that render the practical implementation of assessment for learning problematic and propose possible solutions.
- Draw linkages in NIE assessment practices to build relevant assessment literacies in school teachers.

The panel recognised that NIE programmes and courses must model the professionalism and practices that we want our graduates to be and to implement. At the individual course level, there is a need to achieve careful integration of assessment for learning *and* assessment of learning. This is very challenging for faculty members. In addition to the literature review findings, the panel also acknowledged the MOE's review and recommendations to explore ways to refine the examination and assessment landscape in Singapore primary and secondary schools and junior colleges. While these recommendations, and related strategies, have far broader implications for other stakeholders in the education system, there are both explicit references to the NIE and opportunities to articulate within the NIE on how some of these recommendations may be realised. Moving forward, it will not be possible to identify a clear vision of what the NIE can achieve, without first looking at the current state-of-the-art of the assessment practices and literacies of NIE student teachers. This constitutes a baseline study for deliberating on a suitable framework of professional learning for both student and experienced teachers. Such an audit can also hopefully be useful for educators in other sectors to understand the need for more comprehensive and updated set of assessment practices and literacies today.

AUDIT OF ASSESSMENT PRACTICES AND ASSESSMENT LITERACIES

The focus of the assessment audit was to identify the types of assessment practices, as well as their pervasiveness within the teacher preparation programme for all student teachers. At the point of audit for the period 2008–2009, the information gathered included only summative assessment practices. Future audits were intended to be expanded to capture formative assessment practices.

It was also intended to extend the regular audit of assessment practices to in-service programmes for experienced teachers. The audit exercise is typically conducted at the start of the semester. Course coordinators from each of the teacher preparation programmes list the type and weighting of assessment for each course. For this paper, a summary and analysis of the spread and distribution of various summative assessment practices is applied for core courses in the Postgraduate Diploma in Education (PGDE) and BA/BSc degree programmes. Students from these courses make up the bulk of students in the teacher preparation programmes. The different assessment practices obtained from the Assessment Audit are broadly divided into four categories, namely Reflection, Practical Assessments, Examinations/Tests and Analysis/Synthesis. Table 1 lists the four categories of assessment practice, their objectives and some sample assessment activities.

Table 1.

Different assessment practices within the NIE pre-service programme.

Types of Assessment Practices and Objectives	Examples of Specific Assessment Activities/Tasks
<p><i>Reflections</i> To develop the capacity for self-assessments for reflective and self-directed learning.</p>	<p>Reflection logs Journal Case studies Portfolio</p>
<p><i>Practical Assessments</i> To apply theoretical concepts in simulated/actual classroom situations.</p>	<p>Micro-teaching Field trips</p>
<p><i>Examinations/Tests</i> To gauge the competence level in theoretical foundations and content knowledge.</p>	<p>School-based practical activities Classroom experimental activities Paper-and-pen examinations</p>
<p><i>Analysis/Synthesis</i> To strengthen the theory–practice linkages of classroom teaching, learning and assessment.</p>	<p>Unit and lesson plans Research papers Analysis of test Items Role play/simulation package</p>

A summary of the spread of the four types of summative assessment practice in the PGDE and BA/BSc degree programmes is shown in Figure 1.

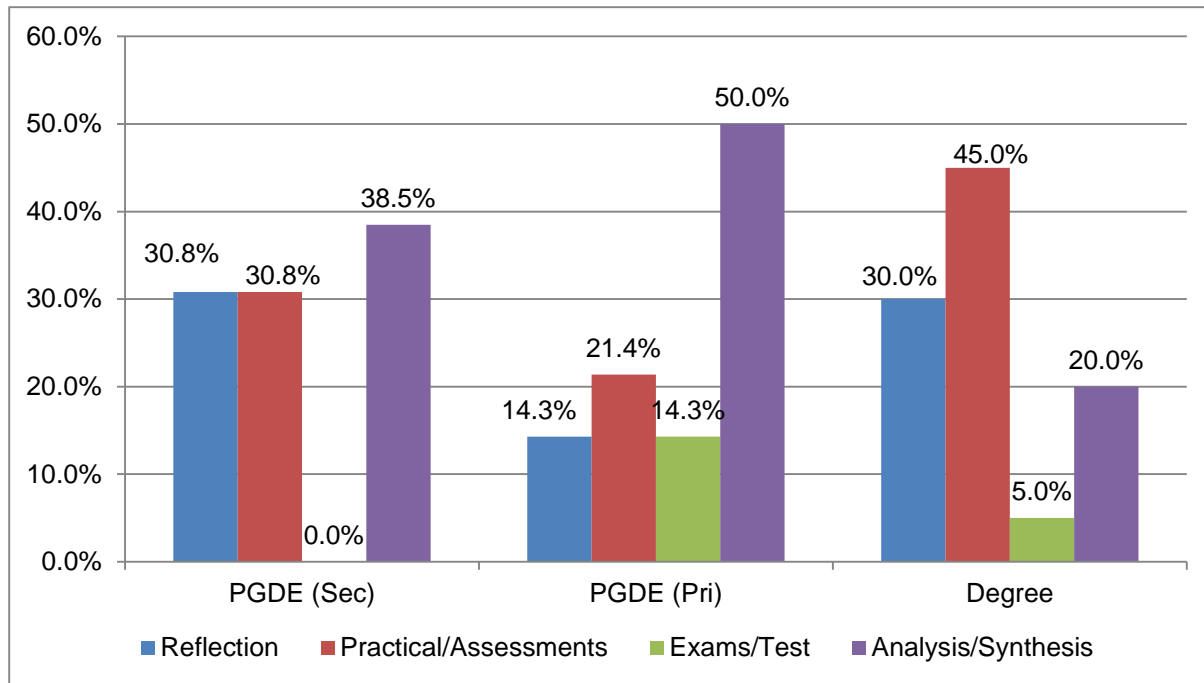


Figure 1. Summary of spread of summative assessment practices across PGDE and BA/BSc degree programmes.

The general trends observed are consistent with the assessment design within the pre-service programmes, offering a diverse focus on different assessment practices. It is noteworthy that examinations and tests do not constitute a major part of assessments for either the PGDE or BA/BSc degree programmes. The distribution of assessment practices also varies between the PGDE and BA/BSc degree programmes and this could in part be explained by the differences in programme duration. The PGDE programme, being a 1-year professional teacher certification programme, is geared towards assessments that encourage rapid theory–practice linkages and the development of essential skills and knowledge. On the other hand, the BA/BSc degree programme, with its longer duration of 4 years, offers more room and time for practical-based assessments and a gradual build-up of student teachers’ analytical/synthesis skills.

An Assessment Literacies Survey was also conducted in 2009 for graduating student teachers from the PGDE, BA/BSc degree and diploma (DipEd) programmes. The 2-part, 12-item survey instrument is a self-evaluation tool for their level of awareness of assessment in teaching and learning. For the purpose of this survey, assessment literacies are defined as a composite of assessment knowledge (e.g., principles and other theoretical assessment constructs) and intended practices (actual manifestation of assessment skills in the school/classroom context). The student teachers would have learnt and practised assessment throughout their teacher-preparation programmes in the Education Studies and Curriculum Studies courses (ES/CS) and Practicum. The two parts of the survey inquire on the specific requirements of assessment literacies at the knowledge and intended practice level:

Part 1 (Knowledge)

- Purposes of Assessment
- Validity and Reliability
- Statistical Concepts in Measurement
- Assessment Tasks
- Assessment in Classroom Pedagogy

Part 2 (Intended Practices)

- Selection/Design of Assessment Tasks
- Demonstrating Formative Assessment Practices
- Clarifying Assessment Criteria/Standards
- Providing Feedback
- Scoring/Interpreting Results

A total of 1,922 student teachers were invited to respond to the survey. Ultimately, 1,676 student teachers (87.2%) provided readable and complete responses. The teachers were from the three main student teacher programmes: PGDE ($n = 870$), DipEd ($n = 519$) and BA/BSc ($n = 287$). The data was also analysed based on the Curriculum Studies (CS) subject assignment of the teachers. Each student teacher was assigned to specialise and teach in at least two CS subjects (CS1 and CS2).² The breakdown of the number of teachers based on their CS1 subject is as follows: English ($n = 500$), Maths ($n = 194$), Science ($n = 204$), Humanities ($n = 63$), Mother Tongue ($n = 182$), Art/Music ($n = 36$) and PE ($n = 112$). Non-readable or incomplete data constituted a negligible percentage (< 2%) of the total responses.

² The assignment of CS1 and CS2 subjects are typically based on the extent of subject specialisation in the academic subjects from their degree programme. CS1 typically suggests a major in that subject in the academic study from their degree programme.

The means of the self-ratings of assessment knowledge were between 3.5 and 4, suggesting that student teachers across the programmes were relatively confident in their assessment knowledge (see Table 2). Although the data suggests that there was no single aspect of assessment knowledge that presents particular difficulty for teachers, it may be of concern that the majority of the teachers were not able to commit to a level 4/5 (agree and strongly agree) response for any statement. There is no significant change when the data is analysed based on grouping the teachers in their CS1 subject group (see Table 3). The Humanities and Art/Music teachers had reported that they were less confident ($M < 3.5$) about understanding and interpreting statistical concepts when compared to the other teachers. The final analysis (see Table 4) looks into a comparison of the ratings of their perceived knowledge of intended assessment practices, when asked to compare between their CS1 and CS2 subjects. The means of most of the responses, with reference to their CS1 and CS2 subjects, were mostly between 3.5 and 4, although there was significantly less homogeneity across the teaching subjects. It is, however, worth noting that the mean responses in relation to CS1 of PE students exceeded 4. Comparison of means using the paired samples *t*-test showed that, for most students, the mean ratings for the intended assessment practices associated with CS1 were significantly higher than those for the CS2 subjects ($p < .05$). For pre-service students with CS1 English, however, the mean ratings for CS2 subjects were found to be surprisingly significantly higher than the mean ratings for their CS1 (English) subject ($p < .05$). In addition, the difference in ratings of Art/Music for CS1 and CS2 subjects were not statistically different. These findings may suggest that the students' perceived confidence in their intended assessment practices are inherently related to the extent of expertise in their content knowledge of subject and teaching subject specialisation.

Table 2.*Assessment knowledge of pre-service teachers (according to programmes).*

	Purposes		Reliability/Validity		Statistical Concepts		Assessment Tasks		Pedagogy (1)		Pedagogy (2)		Pedagogy (3)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
All <i>n</i> = 1676	3.96	0.65	3.94	0.65	3.64	0.81	3.80	0.73	3.85	0.68	3.88	0.64	3.77	0.67
PGDE (Pri) <i>n</i> = 275	3.99	0.68	3.93	0.69	3.61	0.78	3.65	0.82	3.71	0.71	3.79	0.69	3.67	0.73
PGDE (Sec) <i>n</i> = 595	3.96	0.64	3.88	0.66	3.56	0.84	3.76	0.69	3.83	0.65	3.82	0.61	3.68	0.66
DipEd <i>n</i> = 519	3.97	0.64	4.00	0.61	3.75	0.78	3.88	0.69	3.93	0.66	4.00	0.62	3.91	0.61
BA/BSc (Pri) <i>n</i> = 199	3.97	0.67	4.02	0.66	3.72	0.81	3.89	0.74	3.89	0.70	3.92	0.63	3.87	0.68
BA/BSc (Sec) <i>n</i> = 88	3.84	0.68	3.85	0.64	3.54	0.79	3.87	0.74	3.84	0.75	3.79	0.72	3.64	0.76

Note: Mean scores (M) were based on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree)

SD = standard deviation; n = number of pre-service teachers

Table 3.*Assessment knowledge of pre-service teachers (according to CSI subjects).*

	Purposes		Reliability/Validity		Statistical Concepts		Assessment Tasks		Pedagogy (1)		Pedagogy (2)		Pedagogy (3)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
All <i>n</i> = 1676	3.96	0.65	3.94	0.65	3.64	0.81	3.80	0.73	3.85	0.68	3.88	0.64	3.77	0.67
English <i>n</i> = 500	3.98	0.62	3.93	0.68	3.59	0.82	3.79	0.75	3.82	0.69	3.85	0.66	3.76	0.70
Maths <i>n</i> = 194	3.95	0.69	4.00	0.66	3.61	0.82	3.82	0.74	3.85	0.69	3.82	0.68	3.77	0.67
Science <i>n</i> = 204	3.96	0.63	3.86	0.62	3.73	0.73	3.79	0.68	3.79	0.67	3.78	0.56	3.64	0.64
Humanities <i>n</i> = 63	3.92	0.75	3.79	0.77	3.10	1.04	3.59	0.78	3.73	0.72	3.86	0.67	3.60	0.75
Mother Tongue <i>n</i> = 182	3.98	0.70	4.00	0.64	3.73	0.77	3.84	0.74	3.94	0.66	4.01	0.63	3.88	0.66
Art/Music <i>n</i> = 36	3.79	0.65	3.77	0.63	3.42	0.80	3.66	0.74	3.64	0.66	3.69	0.65	3.59	0.67
PE <i>n</i> = 112	3.93	0.55	4.02	0.50	3.83	0.79	3.90	0.61	3.94	0.59	3.97	0.58	3.89	0.58

Note: Mean scores (M) were based on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree)

SD = standard deviation; n = number of pre-service teachers

Table 4.*Intended assessment practices (comparing CS1 and CS2 subjects).*

	Assessment Tasks			Formative Assessment			Standards/Criteria			Feedback			Scoring/Interpreting		
	M(CS1)	M(CS2)	<i>t</i>	M(CS1)	M(CS2)	<i>t</i>	M(CS1)	M(CS2)	<i>T</i>	M(CS1)	M(CS2)	<i>T</i>	M(CS1)	M(CS2)	<i>T</i>
English (CS1) <i>n</i> = 500	3.46	3.8	8.54*(-)	3.73	3.82	3.08*(-)	3.66	3.73	3.11*(-)	3.78	3.82	1.63(-)	3.65	3.74	3.43*(-)
Maths (CS1) <i>n</i> = 194	4.05	3.73	6.46*	3.91	3.75	4.24*	3.87	3.66	4.81*	3.91	3.72	5.02*	3.89	3.75	3.92*
Science (CS1) <i>n</i> = 204	3.94	3.78	3.09*	3.79	3.72	1.67	3.81	3.73	2.16*	3.86	3.81	1.32	3.83	3.77	1.96
Humanities (CS1) <i>n</i> = 63	3.97	3.11	4.22*	3.98	3.33	4.33*	4.06	3.43	4.22*	4.02	3.52	3.91*	3.87	3.38	3.4*
Mother Tongue (CS1) <i>n</i> = 182	3.91	3.69	6.53*	3.91	3.79	5.27*	3.94	3.83	4.56*	3.95	3.83	4.30*	3.89	3.78	5.43*
Art/Music (CS1) <i>n</i> = 36	3.73	3.50	0.46	3.77	3.61	0.72	3.83	3.56	1.41	3.97	3.67	1.64	3.80	3.61	0.00
PE (CS1) <i>n</i> = 112	4.13	3.79	3.91*	4.16	3.79	5.02*	4.21	3.90	4.46*	4.21	3.90	4.80*	4.12	3.91	3.37*

Note: Mean scores (*M*) were based on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree)

n = number of pre-service teachers; **p* < .05 (two-tail)

Although the overall survey results indicate that the student teachers perceived themselves as reasonably assessment literate, there was room for improvement across all the standards of assessment literacies and practices. On the other hand, we could also surmise that many graduands may not have had sufficiently experienced the general complexities of assessment in classroom to make a realistic and discerning self-evaluation ([Mertler, 2009](#)). We also infer from the unevenness of responses that the teaching of assessment literacies and practices needs to be more strongly embedded in the teaching of pedagogical content knowledge of each subject area. This is consistent with the findings of researchers (e.g., [Hodgen & Marshall, 2005](#); [Zhang & Burry-Stock, 2003](#)) that different types of expertise in subject and pedagogical content knowledge affect the depth of how different assessment practices could be integrated within the lessons. For subjects such as Maths and Science, there are relatively clear paths of progression of targeted outcomes ([Marshall, 2007](#)). These subjects have a predetermined sequence of what is learnt and taught – there is a predictive nature to the assessment, as teachers need to ensure that students understand what to do at “each step” before moving to the next. In languages, the humanities and the arts, the teaching progression can be a more “meandering, organic affair” ([2007, p. 137](#)). This calls for a greater alignment of expectations in the standard of assessment literacies and practices between the ES and CS subjects. The unevenness and gaps in the assessment knowledge and practice could also be attributed to insecure content and pedagogical knowledge of their respective CS subjects. This could be a more deep-rooted problem and calls for a review of how teachers are assigned their CS1/2 subjects. It may be that some student teachers should be assigned to specialise in just one teaching subject, rather than two.

Assessment Competency Framework

Based on the review and findings of audit, and the growing significance of assessment literacies and practices to twenty-first-century teachers in Singapore, the NIE has committed to a defined set of assessment-learning outcomes to guide the work in both pre-service and in-service training of teachers. This set of outcomes is referred to as the Assessment Competency Framework ([NIE, 2009](#); see [Figure 2](#)) that integrates assessment for *and* of learning.

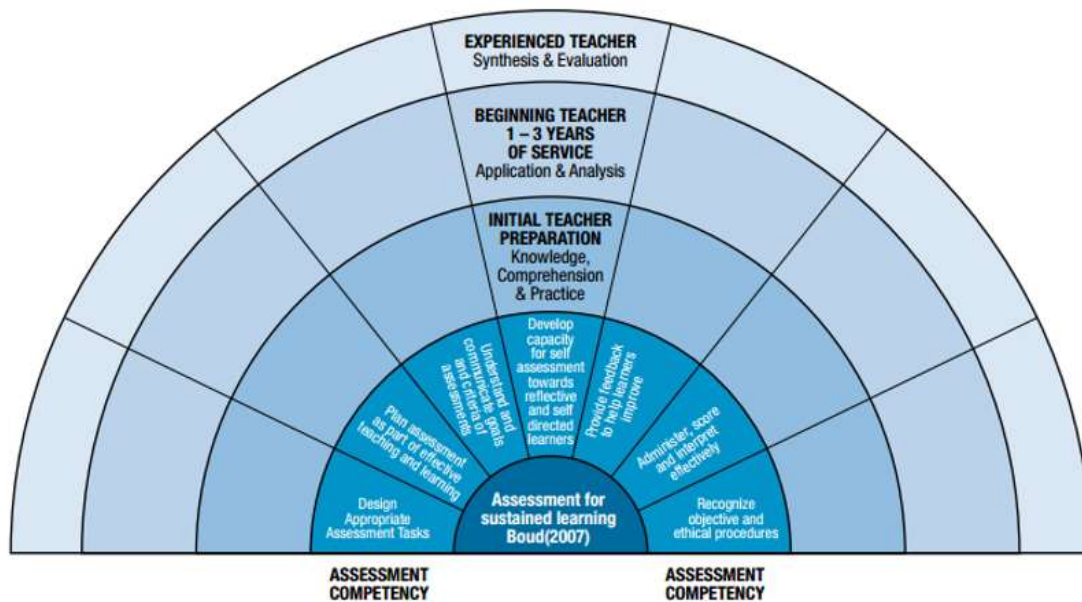


Figure 2. Assessment Competencies Framework
Source: National Institute of Education (2009, p.97).

The framework is not designed to be an exhaustive list of outcomes but rather consists of key elements of assessment competencies for effective teaching and learning in schools. The seven competencies are:

- Designing assessment methods that are appropriate for instructional decisions
- Planning assessments as part of an effective teaching learning process
- Understanding and communicating the goals and criteria of assessments
- Developing the capacity for self-assessments for reflective and self-directed learning
- Providing feedback to learners to improve
- Administering, scoring and interpreting the results effectively
- Recognising unethical, illegal and inappropriate assessment practices

The framework seeks to describe a comprehensive and progressive list of assessment literacies and practices, which has two implications. First, all competencies will need to be taught in a systematic and coherent manner. Second, all competencies will need to be assessed in order to certify and report each teacher's/student teacher's assessment literacies and practice level. In turn, it requires that the teaching or mentoring faculty would possess a level of assessment competency that is higher than the level at which students are taught and assessed. Through specifying entry-level competency requirements, the framework supports the concept of learning of assessment as a continuum that begins in a pre-service setting and continues with life-long professional education and experience (Boud, 2007).

The framework of these seven competencies has been used as a guide by the NIE and the MOE since 2012 to identify the knowledge, skills and values of assessment that all teachers (including student teachers) should possess and hone as part of their professional journey. For the student

teachers, in particular, the polygamous principles of assessment interrogating the why, what, how and when of assessment are more tightly knitted in the various CS and ES subjects. There is also promising work done to help student teachers to draw from findings in neuroscience research (e.g., [Zadina, 2014](#)) to understand how formative assessment is about building multiple pathways of learning for individual students. Some of the important values of formative assessment that are compatible with developing and firing critical neural networks for life-long learning include:

- help students feel safe to fail and to try or “stand up” again;
- encourage students to believe that it is not a matter of “I cannot” but “I have not”;
- remind students that practice does not always make perfect; and
- design assessment that involves balancing predictability and novelty.

For NIE faculty members, a range of staff development opportunities has been provided for the development of progressive assessment literacies. For instance, various platforms (including online sites) have been created for staff to be involved in conversations that support reflection on their assessment practices and to seek and share best practices with one another. Various programme offices have also reviewed the content of CS and ES to ensure that these competencies are developed to the appropriate level within pre-service and in-service programmes in a systematic and developmentally appropriate way. A distinct and comprehensive assessment literacies module has also been offered since 2013 to some pre-service students. This course has the advantage of entrusting the curricular, teaching and assessment responsibilities of the framework to a single programme coordinator. The structural advantages of “housing” the varied complexities of assessment literacies and practices in a single programme offer logistical expediency and enhance the singularity of conceptual coherence. They also make assessment literacies and practices an explicit NIE graduand competency. More work is needed to verify and validate the competency framework since the theorisation – and its application of developmental pathway using the Bloom taxonomy as a way of framing – is still in its infancy. There is likely no one definitive pathway for the professional learning of assessment, like any other aspects of teacher education. Price et al. ([2012, p. 8](#)) rightly assert that the term *competency framework* could be more appropriately thought of as a “gateway” or “threshold” of knowledge and skills of learning of assessment. They are enablers for teachers to learn, engage with and develop more sophisticated conceptions and practices of classroom assessment.

CONCLUSION

A key message from this paper is that there needs to be a comprehensive and systematic framework that defines a set of knowledge and skill-based competencies for teachers to be assessment literate in the classrooms of tomorrow. This set of competencies takes into consideration new and cutting-edge assessment practices for teacher education, clear definitions of the kinds of literacies that teachers need in order to develop authentic and relevant assessment practices for student learning, and the overall competencies for implementing and integrating these theories into practice. This calls for a look at the ways in which assessment intersects with teaching and learning for the achievement of intended learning outcomes. The NIE’s pre-service programmes provide the foundations for pre-service teachers to be assessment literate, while the in-service programmes build on these foundations towards a competent teacher who integrates assessment practices to

enhance and motivate student learning. Assessment-competent teachers understand the importance of aligning a range of valued achievement targets with the appropriate assessment practices to provide valid information for the intended purpose. It is important for all teachers to develop professionally and to acquire the requisite professional knowledge and the ability, ethics and discernment to practise assessment appropriately.

The review and auditing exercise leads to the recommendation that, first and foremost, there needs to be a broadening of the definition of what assessment entails and its role in preparing tomorrow's teachers for tomorrow's students. Some of the teacher training of assessments may currently be in silos, residing only in certain subjects. A conceptual shift is required to balance the individual "doing of assessment" with a "collective consensus", thus creating communal practices in sound and sustainable assessment (Boud, 2000). Simply collecting assessment data and dutifully recording it on an individual student teacher's record is no longer adequate. Rather, there is a need to move from a passive interpretation to an active application of assessment data that will impact teaching and learning. Boud (2007) notes that the greatest conceptual shift that has taken place in recent times in higher education is the shift in focus from the teacher and what he or she does to a perspective in which student learning is central. There is a need to include innovative assessment practices in keeping pace with changes in teaching and learning activities across all sectors of education. Innovative assessment practices can build on the fundamentals of good summative assessment practices (probably more apparent in Asian classrooms) and satisfy the needs for a more flexible, participatory, competence-based learning process for lifelong learning. This paper has documented one such example developing an assessment competency framework which attempts to engage insightfully and purposefully various milestones and competencies. The ripple effects of realising the learning through the connoisseurship of seeing and continual inquiry hopefully can sustain all student and experienced teachers' capacity to generate formatively and transform lasting outcomes of education.

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