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NEXT-GENERATION ASSESSMENT SPURS SMARTER LEARNING

LA EVALUACIÓN DE NUEVA GENERACIÓN ESTIMULA UN APRENDIZAJE MÁS INTELIGENTE

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ABSTRACT

Interest in learning has grown well beyond class-based interactions between teachers and students. The value of higher learning keeps growing, spurring the need for education innovation and reform. To this end, this paper introduces the 'smarter learning' initiative, spotlights reforms required to achieve underpinning 'next-generation' forms of assessment, and articulates feasible steps ahead. The argument driving this paper is that learning is becoming more valuable, that improving learning hinges on assessment reform, and that such innovation will yield major productivity advances for higher education and broader communities.

Key words: learning, assessment, reform, innovation.

RESUMEN

El interés por el aprendizaje ha crecido mucho más allá de las interacciones entre maestros y estudiantes durante la clase. El valor de la educación superior sigue creciendo, estimulando la necesidad de innovación y reforma educativa. Con este fin, el presente trabajo presenta la iniciativa "aprendizaje más inteligente", destaca las reformas necesarias para alcanzar formas de evaluación de la "próxima generación" y articula los futuros posibles pasos. El argumento que impulsa esta investigación es que el aprendizaje se está volviendo más valioso, que mejorar el aprendizaje depende de las reformas en la evaluación, y que dicha innovación producirá importantes avances de productividad para la educación superior y en general.

Palabras clave: aprendizaje, evaluación, reforma, innovación.

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IMPROVING LEARNING

Interest in learning has grown well beyond class-based interaction between teachers and students. The value of higher learning keeps growing, spurring the need for education innovation and reform (UNESCO, 2015; OECD, 2019). Global population growth keeps spurring an increasing need for higher education to reach more people than ever before. Economic development is shifting more people in more countries into professional roles which require higher learning. Longer lifespans are leading people to work for longer, requiring re-skilling, re-directing, and re-certification. The global race for top-talent has intensified, spurring a need to understand not just learning at scale but also in extremely novel contexts. To understand and advance the growth of learning, a growing suite of research and development is advancing economic models, platforms, professions and networks to shape the future of learning (Coates, 2017, 2020). Such work confers important impetus for this paper, as it establishes the broader value of learning and major foundations and rationales for assessment reform work.

Assessment plays a huge role in learning. Done well, assessment plays a core role in articulating what learners already know, in helping people learn, and in spotlighting what learners need to learn. Done poorly or without reflection, assessment can waste time and money, spur anxiety and distaste for learning, provide misleading information, and generate adverse outcomes. Assuming most education practice lies between these extremes, the goal of assessment reform is to shift practice hence learning towards the positive end of the spectrum. Reformed assessment gives people the feedback and encouragement they need to learn in smarter ways.

Here lies a problem, for despite the crucial role it plays in higher education, assessment has yet to have its transformational moment. Online learning and workforce changes have transformed curriculum and teaching, for instance. Major platforms and business transformations have disrupted and reconfigured admissions and broader forms of student management. Yet much assessment is still being done today as it was a century ago (Coates, 2014, 2020) and there remain pressing reasons to reform. Of course, reform rationales have only proliferated and diversified since early 2020 disruptions to international and campus-based education. Coates, Xie and Hong (2020) have detailed the extent of accelerated reconfiguration of education fundamentals.

There have been many attempts to transform assessment. These attempts are reflected in a flow of topic-specific research publications (e.g. Melguizo & Coates, 2017; Boud & Falchikov, 2007; Carless, 2015; Coates, 2014; Zlatkin-Troitschanskaia, Pant & Coates, 2016). As well, it is important to recognize the innovative but local efforts of millions of academics. Larger signature initiatives have involved imposing qualification frameworks, cross-national benchmarking projects, discipline-specific reforms, the tuning of curriculum structures, training scorers, and implementing standardized assessments (Hazelkorn, Coates & McCormick, 2018b; Coates, 2016). Such initiatives have registered various advances, yet they have failed to tip the scales and spur pervasive new norms, policies or practices (Price, 2005; Gibbs, 2006; Deneen & Boud, 2014; Carless, 2017).

Deep analysis of higher education exposes interlocking forces hindering change. Though it is difficult to be conclusive, from consultation with hundreds of experts and stakeholders (see: Wagenaar, 2014; Kuh & Jankowski, 2018; Coates, 2014, 2017; Zlatkin-Troitschanskaia, Pant & Coates, 2016; Coates & Richardson, 2012; Medland, 2016) it appears several key forces are at play. These include institutional priorities, workforce and resource capabilities, as well as options and capability for change. Many of these hindering forces seem exogenous to assessment itself. Such complexity highlights the significance of assessment. It also signals that 'business as usual' is unlikely to prevail. There is a need for smart workarounds.

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JOURNAL OF SUPRANATIONAL POLICIES OF EDUCATION, nº13, pp. 88-103

As with any important facet of education there are cogent reasons for improvement. These have been distilled in a range of international projects (e.g. EC, 2004, 2008; OECD, 2012; AQFC, 2013; ASEAN, 2014; UNESCO, 2015; CALOHEE, 2018). For instance, there is value in advancing assessment in the spirit of continuous improvement. There are strategic institutional rationales for finding innovative ways to assess student learning. Graduate employer and business concerns about education standards ultimately fall back to concerns about assessment. Assessment is a fulcrum for enhancing student engagement and retention. At the same time, by doing assessment better and cheaper there is enormous educational and financial value to be found for institutions, faculty, students and governments. Producing more cogent data on outcomes would yield broader dividends by proving economic and social returns from education, an important addition to other information about quality.

With this background, momentum and trajectory in mind, this paper introduces the 'smarter learning' initiative, spotlights reforms required to achieve underpinning 'next-generation' forms of assessment, and articulates feasible steps ahead. The argument driving this paper is that learning is becoming more valuable, that improving learning hinges on assessment reform, and that such innovation will yield major productivity advances for higher education and broader communities.

To stimulate momentum and guide progress, this paper is forward-looking and design-oriented rather than overly analytical or technical. It is conservative and also ambitious. The ideas are well grounded, as the analysis draws on two decades of international research into policy- and institution-focused learning and assessment research in higher education (Coates, 2014, 2016, 2020; Cantwell, Coates & King, 2018; Hazelkorn, Coates & McCormick, 2018). The analysis engages directly with 'supranational education policy' by drawing on research spanning more than 30 countries and all global regions, and by projecting policy designs which reflect the supranational realities of contemporary higher education. The paper provides education leaders with an overview of the field, and a guide to thinking about current practices as well as institution and policy innovations.

This paper unpacks these ideas and sketches one perspective for innovation. It discusses the characteristics of smarter forms of learning. It argues that smarter learning hinges on particular kinds of assessment reform, specifically deft integration of a constellation of technological, practical and educational factors. It presents the results of a multi-university feasibility study which helps to explore and ground the ideas of 'smarter learning' and 'next-generation assessment'. It concludes by articulating what appear to be the best steps ahead.

'SMARTER LEARNING'

As this paper conveys, 'smarter learning' is an initiative being developed for contemporary higher education. It is grounded in the normative perspective that 'learning is smarter' when assessment is reformed in ways that enhance integrity and productivity (Smarter Learning, 2021). Such reform rests on deft education design, robust platforms and careful reconfiguration of management and business processes. Smarter learning blends world-leading assessment capability and learning software with education expertise to advance learning experiences and outcomes. It is better for learners, teachers, institutions and stakeholders.

What, then, does it mean to enhance the integrity of assessment? The robustness of assessment can be aligned with a range of technical criteria which are far from specific to higher education. Gleaned from a century of measurement science research, such criteria ultimately go to spotlighting and emphasising different forms of validity (Coates & Richardson, 2012; Richardson & Coates,

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2014; AERA, APA & NCME, 2015). These very general principles have been clarified into standards which are far more relevant to higher education.

For instance, Table 1 lists indicative standards which are broadly relevant to all assessment tasks. Such standards are necessarily normative ideals. It would be difficult, if not impossible, for any task to fully meet these expectations. It is important, and distinctive, that critical consideration be given to each standard in task design, development, implementation and review. The quest is not that a task be flawless, but that it has known and optimised properties.

Table 1: Indicative assessment standards with prompt questions

Standards	Prompt questions
Coverage	Does the task cover sufficient range and depth of content and all relevant material?
Authenticity	Does the task seem relevant and real? Does it appear useful and meaningful?
Criterion	Does the task correlate with other indicators of similar topics?
Discrimination	Does the task distinguish varying performance levels?
Practicality	Is it easy for students to engage with the task? Is the task 'user friendly'?
Efficiency	Is the task efficient for staff to implement and use standard equipment and procedures?
Responsiveness	Does the task yield timely feedback for students? Does it support lively learning?
Interpretability	Are task requirements understood by all students? Is task language easy to read?
Transparency	Are task requirements and expectations clear to students?
Educational	Does the task prompt students to learn and contribute seamlessly to the experience?
Consequential	Does feedback have expected consequences and promote improvement?
Production	Are task materials produced to a high standard? Have they been designed and proofed?
Clearance	Have relevant legal and cultural approvals have been secured for the task?
Consistency	Does the task perform consistently across people, time and contexts?
Alignment	Does the task align with students, curriculum, teaching and outcomes?
Distinctiveness	Is the task sufficiently distinctive and does it add unique value and insights?
Scoring	Do rubrics enable sound and generalisable scoring?
Validation	Have task materials been validated and improved by students?

Source: Coates (2020, p 106)

What does it mean to make assessment more productive, to make quality-informed advances in efficiency? Enhancing the productivity of assessment goes in general terms to increasing the ratio of outcomes to inputs by delivering the same or more outcomes for the same or fewer inputs, while holding quality constant. Outcomes, in this respect, include the number and variety of assessments. Inputs include staff and student time as well as direct and indirect costs. With assessment, boosting productivity seems most likely to be achieved through input reduction rather than a greater number of assessments. This necessitates a different production function.

Such change is required to deal with the growth of higher education. For instance, recent conservative reckoning (Coates, 2018) found that that the number of pieces of assessment each year in Australian higher education had risen from around seven to nearly 30 million in the last twenty years. With no change in production function this implies a quadrupling in recurrent annual costs to more than $400 million for marking alone, leaving aside all of the other large costs for assessment development, administrative and support staff, capital and intermediaries. All up, including indirect costs, it is easy to see how largely unreformed assessment practices might be costing close to a billion dollars annually. Given that Australia has less than half a per cent of the world's higher education students, these figures balloon into a much broader need for assessment productivity reform.

What is required to spur such progress? Analysis of recent advances in higher education, spanning many operational levels and functions, and crossing many countries, indicates that substantial gain

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has been derived from careful integration of educational, technological and practical resources (Coates, 2020). Education expertise, of all substantive and technical varieties, can furnish theories and ideas but not the resources or infrastructure for change. Despite compelling rhetoric, technology alone has proved insufficient to advance education, though it serves well in facilitating and catalysing roles. And practical efforts, including financial, operational or political rationales, have a track record in higher education of sparking inadequate, unstable and precarious change.

The success of many productive contemporary reforms is that they put education first and position technology and practical matters as enablers. In this 'value-creating constellation', practical nous is the glue that binds these ingredients in ways which yield additional quality and productivity. As Wong (2019) and Liu, Wong and Coates (2019) have clarified through case study and conceptual analysis, contemporary academic reforms have flourished not because they involve technology, but because they engage technology in practical solutions which advance the productivity of higher learning.

It is important to clarify that 'smarter learning' goes beyond the typical shift from instructivist to constructivist forms of education, or from teacher- to student-centred forms of exchange. The big difference is that, as the initial definition conveys, 'smarter learning' is about the quality and productivity of learning, not activities and conditions relating to people and institutions. This is important, for it immediately shifts focus onto the value, outcomes and impact of learning, and it immediately dislocates learning from particular people and places. As Coates (2020) conveys, contemporary shocks and transformations to higher education have clarified that necessity and significance of such shifts.

ASSESSMENT REFORM

Assuming such progress is merited, then how should it be directed? To begin, it's helpful to position the progress of assessment reform to date, further to the remarks made in the introduction. This highlights the value of parameterising assessment in ways which can be used to probe weaknesses and, more constructively, to explore and synthesise options for development.

The evolution of assessment reform can be framed in three eras. Coates (2014, 2018) unpacks the historical, educational and technical analyses which underpin this articulation. Table 2 highlights shifting practices in the transition from traditional, through stretched, to next-generation practices. Key characteristics of traditional approaches to assessment, which are highly individual and collegial in nature, are shown towards the left. Roughly, they might be considered to correspond with what is often denoted loosely as the 'elite' era. These traditional practices have been stretched in recent decades as higher education has expanded, during what is often terms the 'mass' era. Much of this growth has been expansionary rather than transformative in nature. Legacy practices have been stretched and patched for bigger delivery as higher education has expanded. Technical, institutional and educational analysis reveals, however, that traditional assessment is costly when scaled, and quality may suffer. Shifting to next-generation assessment, in what is sometimes flagged as the 'universal' or 'global' era, represents the kind of reformed assessment which carries potential to undergird 'smarter' forms of learning. The depiction in Table 2 is of course an oversimplification, but it does help to highlight general characteristics, developments and trajectories.

Table 2: Three eras of assessment

	Traditional	**Stretched**	**Next-generation**
Context	Elite	Massified	Global
Timeframe	1990s and before…	1990s to 2020	…2020s and after
Authority	University	University or regulator	Shared
Production	Solo academics	Academic teams	Co-creation
Format	Paper	Paper and online	Online
Location	Campus	Campus and online	Online
Implementation	Universities	Universities	Engineers
Scoring	Solo academics	Moderated practice	Automated
Reporting	Generic	Contextualised	Customised

Source: Coates (2018, p.6)

How then can assessment be understood in ways that illuminate weaknesses and options for development? Adopting a value chain perspective and deconstructing assessment into key phases and activities is helpful. Table 3 models this, presenting an evaluative model which draws from measurement science research (e.g. Mislevy, Almond & Lukas, 2003; Bennett, 2015; Richardson & Coates, 2016). Borrowing these mechanisms situates higher education in the broader world and helps garner the most scientifically relevant insights. The basic model provides a compelling lens for reviewing existing bottlenecks and options for reform.

Each specific assessment context does of course have its own situation hence evaluative particularities. For current purposes, the framework is helpful to highlight the overarching innovation need and opportunity. Meta-analysis of thousands of contexts (for details, see: Coates, 2014, 2016, 2018, 2020) has affirmed that such need and opportunity is indeed 'across-the-board'. Particular circumstances vary, but from a broad perspective every assessment phase and activity could benefit from 'next-generation' reform.

Table 3: Assessment phases and activities

Phase	**Indicative activities**
Planning	Governance, leadership, management
Development	Mapping resources, specifying outcomes, selecting formats, drafting materials, qualitative review, quantitative review, material production
Implementation	Designing administration, organising facilities, managing students, administering assessments, resolving problems
Analysis	Collating results, marking, producing data, cross-validating results
Reporting	Producing grades, analysing and commenting, reporting, reviewing and improving

Source: Coates (2018, p.9)

It is important to emphasise that next-generation assessment involves enhancing the quality and productivity of assessment. It enables, enriches and augments traditional collegial practices. It does not impose top-down or external reform from commercial, governmental, managerial or professional interests, which rarely resonates with everyday academic practice. Nor does it rely on change to bottom-up or collegial practices which are often entrenched and slow or resistant to change, and unlikely to achieve the step-change required. Conceptually, next-generation assessment occupies or builds out the 'middle space' by using assessment techniques and administrative reforms, particularly around collaboration, to strengthen academic practice. This middle-space approach differentiates it strategically from existing or prior initiatives such as OECD AHELO (Coates & Richardson, 2012), the European Commission's CALOHEE (2021), the Australian Learning and Teaching Council's AMAC (Edwards, Wilkinson, Canny, Pearce & Coates, 2014) or a plethora of commercial assessment initiatives.

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From an academic, institutional and technological perspective, this broad need can be distilled into four main modules. These are presented here, and go to making tasks, managing administrations, implementing and proctoring, and marking and reporting. Each module is already being deployed at scale using the Examina+ software (Genix Ventures, 2021), as the subsequent case study conveys.

From a functional perspective, making assessment tasks involves creating, validating, aligning and optimizing online or paper-based tasks. Academics have been making assessment tasks forever, though in traditional ways and not necessarily in ways which optimise educational, practical or technological resources. Shifting away from individual or *ad hoc* task development and adopting task authoring tools boosts the integrity, efficiency and quality of assessment. Such tools enable the adoption of richer and dynamic tasks, collaborative task development, task sharing, and more sophisticated mapping to education and vocation competencies. Deploying such tools within courses or across institutions helps to create and edit tasks, integrate scattered resources, tag and map tasks, align assessment with learning outcomes, proof materials, and generate hybrid assignments and exams.

Managing assessment administrations is about scheduling people, infrastructure and resources. While all higher education institutions have existing arrangements for handling this, these are typically configured in ways which suit traditional rather than next-generation forms of assessment. For instance, they may process programs, courses or people in batches to undertake static tasks, whereas much more dynamic and nuanced forms of sampling can be deployed to enable more astute and authentic matching of students to tasks. Dedicated scheduling software can also help institutions and learners reduce assessment risks and costs by managing schedules, rostering staff and absences, coordinating paper delivery and third-party logistics, logging and investigating incidents, and handling special needs and situations.

Next-generation assessment entails implementation reform, and to the extent required, changes to proctoring arrangements. Particularly when linked with more intentional assessment design, step-change improvements in delivery and security become feasible. In general, this involves deploying technologies which assure quality implementation. Integral tools here involve planning assessments, registering and verifying students, delivering automated and coordinated communications, allocating and aligning people and venues, delivering practice, scheduled and on-demand assessments, enabling real-time monitoring and authentication, and reporting performance metrics. The adoption of contemporary implementation platforms helps shift beyond batch processing of students and assessments, enabling much finer-grained and even task/competence-level alignment of students with assessments.

The final cluster of assessment phases and activities to be distilled into a software module does to marking and reporting. Typically, these activities are handled by academics working alone or in small teams, with reporting taking place as a somewhat private activity between teachers and students. Confidentialities around reporting must be protected, of course, but there are quality and efficiency limitations with keeping all aspects of this process secret. As most large-scale assessments signpost, huge quality dividends can be derived from collaborative marking and from sufficiently anonymised benchmarking. Well-managed collaboration can increase the reliability and efficiency of marking, and reduce reporting errors and delay. Platforms have ample means of supporting secure marking, automating marking, managing markers, dealing with response validation, and generating benchmark and competence-level reports.

Using contemporary platforms to activate assessment modules in these ways, either in module ways or through end-to-end solutions, is giving real-life to next-generation assessment, bringing about

the qualities flagged in Table 3. Without impacting important governance, leadership or management arrangements, the deployment of such software enables various forms of collaboration and co-creation, activation of dynamic and rich task formats, hybrid paper and online implementation, nuanced matching of tasks to learners, and quality assured and customised reporting. Leaving aside obstacles arising from entrenched institutional and faculty practices, advancing such reform seems like an obvious way ahead.

FEASIBILITY STUDY

A feasibility study was conducted between April and July 2020 to evaluate the quality and productivity of the next-generation assessment which fuels smarter learning and to design foundations for future growth. This work did affirm educational, practical and technical feasibility, and it offers useful case study insights into the growth of this field. It is presented here very much as a case study to articulate the above ideas, rather than a full technical or scientific investigation.

In June 2020, faculty and students from a selection of Chinese university business schools participated in a pilot of next-generation assessments of macro- and micro-economics, accounting and statistics. This assessment project was led by a small research team, and driven by the Examina+ platform (Genix Ventures, 2020).

The assessment design was extensive. The project focused on engaging universities, developing frameworks, mapping assessment tasks, assessment implementation, and reporting. The project was co-designed operationally with participating institutions.

A sample of five university business schools was engaged, deliberately diverse in terms of location, context, and concentration. Each institutional team consisted of a senior leader, key faculty in each field to be tested, administrative staff, and students. Collaborative communication groups were formed for each field and for all universities, and several meetings were held. The main meetings consisted of a launch meeting, a mid-project meeting to sign off on the tasks and assessment arrangements, and a final meeting to present and discuss results. The research team was in ongoing contact with university personnel both to provide assistance and also to gather feedback on the success of the platform, materials, operations and experiences. Establishing open communication channels which help faculty share non-confidential insights on assessment is a major value of next-generation assessment.

As these five universities bootstrapped the collaboration, the research team drafted learning outcomes frameworks. Initial frameworks took account of existing frameworks, curriculum materials, and assessment materials. These initial frameworks were modified in an iterative fashion by the research team and university teachers. The frameworks specified broad and narrow curriculum areas and learning outcomes, and the likely difficulty of each task. After the frameworks had stabilised they were configured into the assessment system. Framework development took two months.

Participating universities provided a large array of assessment tasks which were used to build the library of shared assessments. The tasks focused on the introductory level, targeted accounting, statistics or economics, and had a multiple-choice or short-text response format. The research team tagged all tasks with meta-data, edited and formatted them, then loaded them onto the assessment system. The tasks were mapped to the frameworks. The university experts reviewed the shared task library, and selected task samples which took account of focus, difficulty, format and quality. All sharing, review, revision and management of the assessment tasks was handled by the Examina+ platform.

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JOURNAL OF SUPRANATIONAL POLICIES OF EDUCATION, nº13, pp. 88-103

Assessment administration was coordinated by participating universities using standard protocols, and supported by researchers in China and internationally. Specifications for each assessment (e.g. student numbers, time, locations, security, staffing) were finalised with each university. Three of the five universities participated in accounting, one in macroeconomics, four in microeconomics, and three in statistics. The assessment focused on students at the end of their first year of bachelor-level study. In total, 1,199 students were sampled from across the five universities, and 1,125 participated. The assessment platform provided end-to-end support for each assessment in terms of schedule optimization, registration and enrolment, resource management, secure assessment delivery, and automated marking and analysis. Constructed-response tasks were distributed across universities for marking and cross-validation. The research team also audited the marking of a sample of constructed-response tasks.

Reports were prepared for each university. Data was analysed psychometrically. Such analysis confirmed the construct validity, augmenting the content and face validities affirmed through the cross-institutional framework and task development. Chronbach alpha reliability analysis revealed estimates of 0.73 for accounting, 0.66 for macroeconomics, 0.70 for microeconomics, and 0.67 for statistics. These reliability statistics provide a foundation for improvement and signalling areas for improvement. What is more remarkable than the actual statistics is that they could be and were calculated. Such extrapolation of psychometric procedures into everyday university assessment is one of the tenets of next-generation assessment and smarter learning. In the same vein, marker and task performance were analysed, proving novel information to universities on leniency and marker statistics. University reports contained diagnostic and benchmarking insights, and basic descriptive statistical information. These contained information for comparing performance of tasks, students and scorers.

Overall, in post-report meetings, the universities identified specific benefits through participating in the feasibility study, including that next-generation assessment:

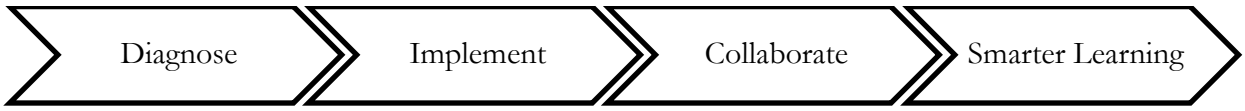
- Helped teachers improve courses and enhance student learning;
- Assured the quality of learning and academic programs for leaders;
- Enhanced the efficiency of assessment, saving time, resources and costs;
- Improved the quality and value of assessment resources and approaches;
- Provided independent third-party assessment data to continuously improve programs;
- Provided scale necessary to support micro-credentials;
- Supported business accreditation requirements;
- Produced reports which enables universities to benchmark against peers and standards;
- Built innovative communities around platforms, methods and research; and
- Engaged faculty in teaching professional development.

Overall, the technically designed, technologically supported and collaborative approach strengthened and streamlined university assessment. The participating universities confirmed this during post-pilot consultations. The universities further saw that foundations had been laid which would mature in following replications.

CONCLUSIONS AND FUTURE RESEARCH LINES

If such aspirations and advance have merit, what changes are required to spur these forms of assessment reform hence development of smarter learning? Three stagewise developments seem required to spur the overarching reform, which could play out in different ways in different contexts.

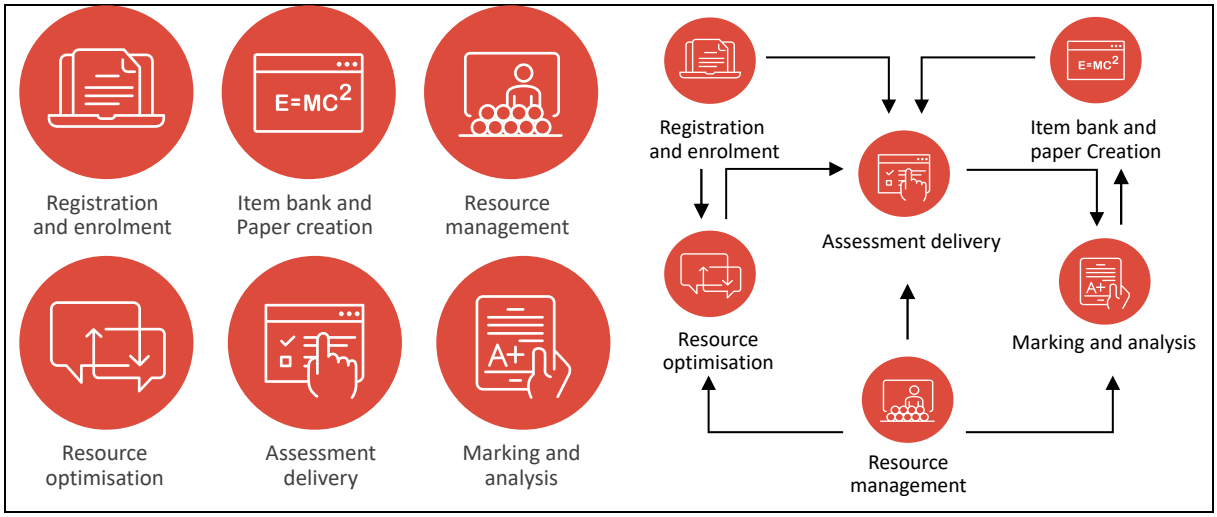
Figure 1: Stagewise developments to guide reform



First, there is a need to evaluate, diagnose and re-design prevailing assessment arrangements. To propel this an 'academic risk ranking' has been developed which invites faculty, academic leaders or whole institutions to evaluate and compare existing assessment arrangements (see: www.smarterlearning.global). This furnishes assessors of all types with insight into the health or strength of current arrangements, and how they compare with other operations. Specifically, users can respond to a selection of quick questions which together yield insight into salient assessment activities and conditions. A report is produced of existing assessment arrangements. This carries intrinsic value, not least as it is a first of its kind, but also serves as a guide for reform. Thinking differently about assessment, giving consideration of methodological, technological and practical factors, sparks consideration of the redesign that underpins next-generation assessment.

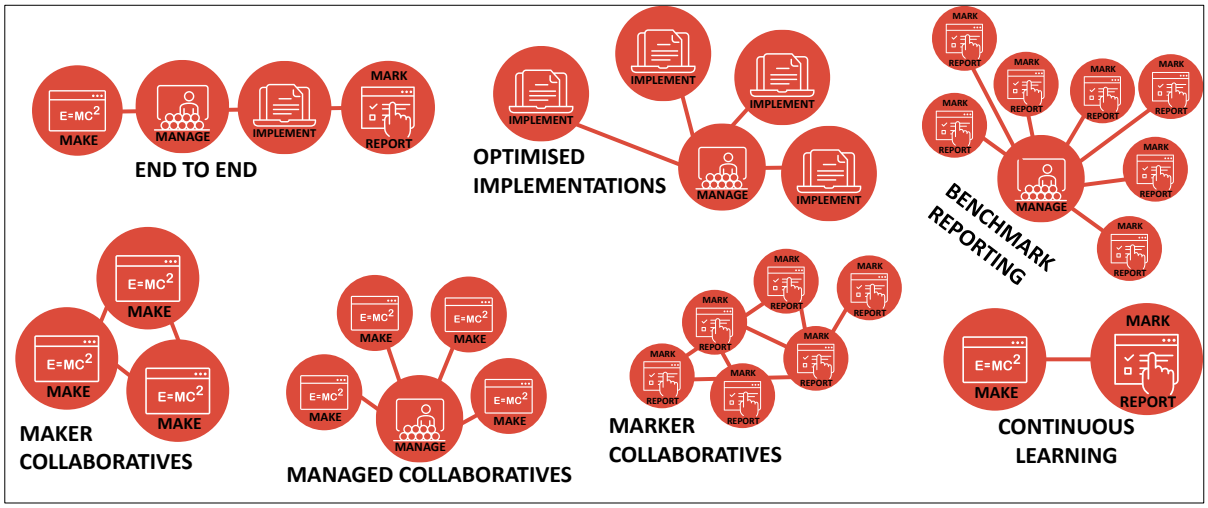
Second, there is a need for teachers, institutions and students to engage with sufficiently sophisticated assessment platform. This of course involves all of the issues associated with software adoption, as well as being made more complex given academic and workforce sensitivities around assessment and entrenched institutional practices. A fertile way forward, beyond system-level deployment, is to enable faculty to experiment with software module and literally 'play around' with the systems and experience the potential. Figure 2 presents facets of the Examina+ platform (Genix Ventures, 2021), which together give life to these modules, and the interplay between these facets.

Figure 2: The Examina+ modular platform



Third, the activation of localised modular assessment software is a precondition for realising perhaps the broadest value of assessment reform, being the formation of academic collaboratives. The modular nature of the system means that such individual experimentation can be joined-up into a synchronised network. These, in many respects, mirror the collaborative networks which sustain and advance academic research. **¡Error! No se encuentra el origen de la referencia.** gives life to this concept, illustrating various kinds of collaboration. Such collaborations could be woven together across institutional and disciplinary boundaries.

Figure 3: Smarter Learning collaboratives

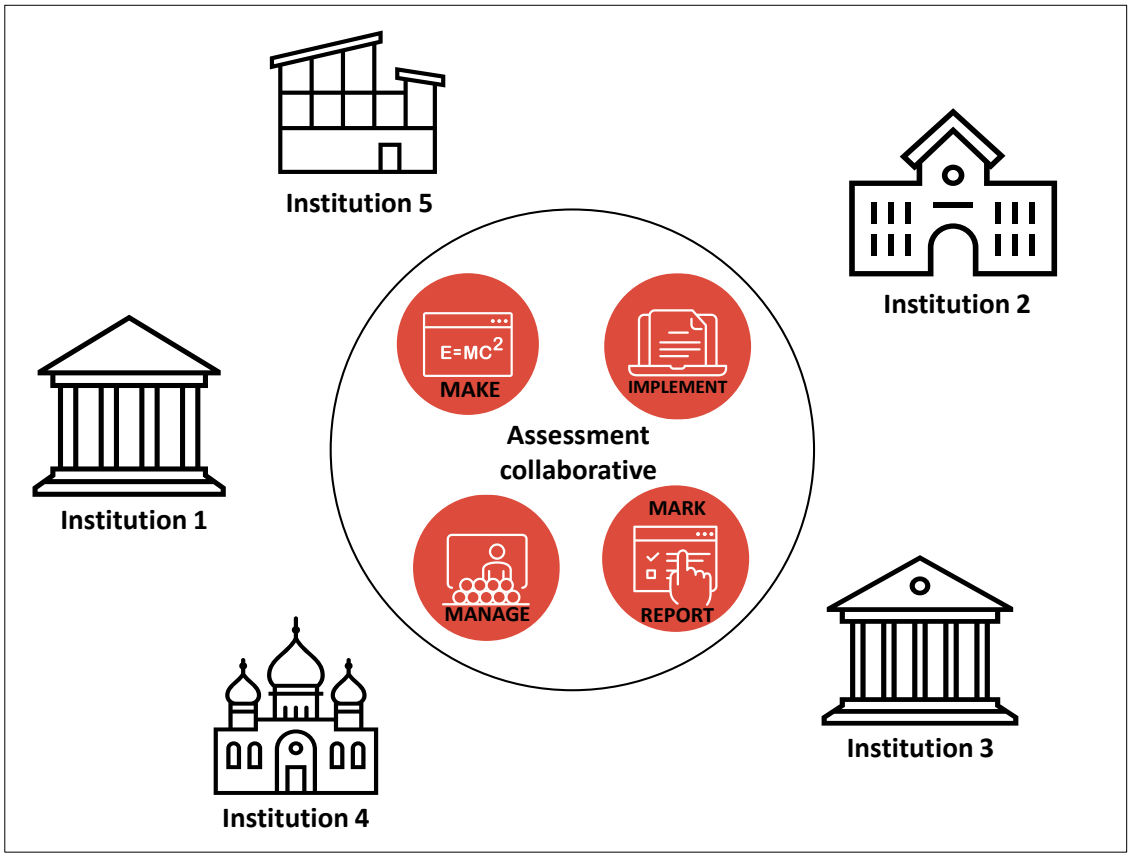


As this paper has conveyed, various forms of structured collaboration are embedded in the next-generation assessment which underpins smarter learning. Next-generation assessment has been designed over two decades with hundreds of experts, universities, governments, teachers and students (Coates, 2012, 2014, 2016, 2018, 2020). It involves collaboration among universities, assessment experts and technology specialists. It involves building shared assessment frameworks and materials, validating materials, online delivery, and the production of sophisticated benchmark reports. Faculty are engaged in structured and formative ways which also boost professional competence. Authenticity is critical. Next-generation assessment builds on the expertise of teachers and universities which, distinguishing it from off-the-shelf products. Participating universities play a key role, contributing expertise, leadership and resources.

These are interesting ideas, but also ideas which have been developed. These reform options have already been tested in hundreds of higher education contexts. This work has affirmed the value of technology-based assessment reform in terms of improvements to quality and productivity. Work is well underway to take them to scale. Rough estimation conveys that about nine billion pieces of assessment are conducted in higher education each year, with about one billion being done online. Given that not all online assessment will be optimised, there seems ample scope for growth.

What, then, could help take these reforms to scale? A variety of technological and business arrangements could help give life to these kinds of arrangements. As an example, it is helpful to sketch one option. Structured collaboration (**¡Error! No se encuentra el origen de la referencia.**), managed by a collaborative consisting of academics from various institutions and experts from industries, is an interesting model to explore further. In this model, a group of participating universities work closely with each other who can share best practices in terms of learning design, contribute to the development of database, standardize assessment content and compare results to derive valuable insights. In addition, experts from professional bodies can be invited to facilitate the mapping between desired skillset in the industry and what is being assessed at university. Chartered Accountants, for instance, might work with universities to help standardize the curriculum and exams in first-year accounting courses and provide the necessary assurance on the relevance of the content as well as accounting accreditation for students who complete the 'audited' courses.

Figure 4: Potential structured collaboration model



This model has several distinctive advantages. The first is improved efficiency through reduction of duplicated efforts. As highlighted, many faculty members are working in silos when developing their own assessments, which is a highly time-consuming. Due to the high degree of overlap in content for many courses (especially the introductory ones), it is far more efficient to have assessments built from a common/shared database as opposed to several similar but discrete databases. The second advance is quality and relevance. The content of many universities courses is obsolete compared to what is going on in that industry today due to the lack of review from professionals currently working there. By incorporating their input and updating the database, all universities can benefit from such quality assurance. The third advance is that despite the huge overlap in content for many courses, differences in the style and format of the assessments resulted from individual idiosyncrasies of instructors make it nearly impossible to compare results outside of one university and derive insights. Standardization enables cross-institution comparison and benchmarking, offering valuable insights for faculty and university management alike.

This paper has introduced the 'smarter learning' initiative, spotlighted reforms required to achieve underpinning 'next-generation' forms of assessment, and articulated feasible steps ahead. By adopting a design-oriented perspective, the paper has argued that learning is becoming more important, that advancing learning hinges on assessment reform, and that such innovation will yield major productivity advances for higher education and broader communities. Figure 5 diagrams this idea with reference to the step-change developments discussed above.

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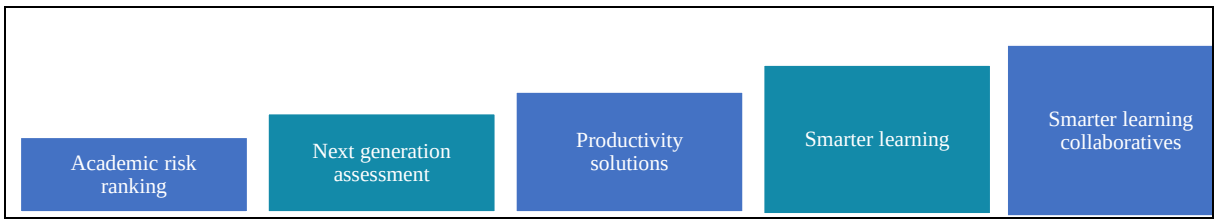
Figure 5: Journey to Smarter Learning



How such progress unfolds hinges on a range of factors, many with no particular relationship to higher education assessment. Coates and Lennon (2014) identified a number of spurs to development, including quality contexts, disciplinary engagement, effective academic leadership, and perceptions of value and relevance. Coates (2020) further integrated these affordances in a broader review of change blockers and identified the 'value-creating constellation' depicted in this paper. The accelerated shift to hybrid education since 2020 has augmented the need and opportunity for reform.

The year 2020 marked an inflection point when assessment became harder for higher education institutions than students. Every day, hundreds of millions of people in the world's 20,000-plus institutions engage in unproductive assessment of learning. This costs time and money, hinders learning, and squanders the capacity for higher education to prove its social, economic and professional contribution. This paper articulates the smarter learning initiative which rests on next-generation assessment creating step-change value for education by raising standards and reducing costs. Smarter learning makes possible step-change advance which enhances the sustainability and prosperity of higher education.

REFERENCES

American Educational Research Association, American Psychological Association & National Council for Measurement in Education (AERA, APA & NCME) (2015). *Standards for Educational and Psychological Testing*. Washington DC: AERA.

Association of Southeast Asian Nations (ASEAN) (2014). *The ASEAN Qualifications Reference Framework (AQRF)*. Accessed from: https://asean.org/storage/2018/12/AQRF-Publication-2018-Final.pdf

Australian Qualifications Framework Council (AQFC) (2013). *Australian Qualifications Framework (AQF)*. Canberra: AQFC.

Bennett, R. (2015). The Changing Nature of Educational Assessment. *Review of Research in Education, 39(1)*, 370-407.

Boud, D. & N. Falchikov. (2007). *Rethinking Assessment in Higher Education: Learning for the longer term*. London: Routledge.

CALOHEE (2021). *Measuring and Comparing Achievements of Learning Outcomes in Higher Education in Europe*. Accessed from: https://www.calohee.eu.

Cantwell, B. Coates, H. & King, R. (Eds.) (2018). *Handbook on the Politics of Higher Education*. Cheltenham: Edward Elgar.

Carless, D. (2015). *Excellence in University Assessment: Learning from award-winning practice*. London: Routledge.

Carless, D. (2017). Scaling up assessment for learning: Progress and prospects. In Carless, D., Bridges, S. M, Chan, C. K. Y. & Glofcheski, R. (Eds.) *Scaling up Assessment for Learning in Higher Education*. Cham: Springer.

Coates, H. & Lennon, M. C. (2014). Propelling the field: Insights, trends and prospects. In H. Coates (Ed.), *Higher education learning outcomes assessment: International perspectives*, 295–312. Frankfurt: Peter Lang.

Coates, H. & Richardson, S. (2012). *An international assessment of bachelor degree graduates' learning outcomes. Higher Education Management and Policy, 23(3)*, 51-69.

Coates, H. (2016). Assessing student learning outcomes internationally: Insights and frontiers. *Assessment and Evaluation in Higher Education, 41(5)*, 662-676.

Coates, H. (2017). *The Market for Learning: Leading transparent higher education*. Dordrecht: Springer.

Coates, H. (2018). *Next Generation Assessment*. Melbourne: Online Education Services.

Coates, H. (2020). *Higher Education Design: Big deal partnerships, technologies and capabilities*. Singapore: Palgrave Macmillan.

Coates, H. (Ed.) (2014). *Higher Education Learning Outcomes Assessment*. Frankfurt: Peter Lang.

Coates, H., Xie, Z. & Hong, X. (2020). *Engaging transformed fundamentals to design global hybrid higher education*. Studies in Higher Education.

Deneen, C. & Boud., D. (2014). *Patterns of resistance in managing assessment change. Assessment and Evaluation in Higher Education*, 39(5), 577–591.

Edwards, D., Wilkinson, D., Canny, B., Pearce, P. & Coates, H. (2014). Developing outcomes assessments for collaborative, cross-institutional benchmarking: Progress of the Australian Medical Assessment Collaboration. *Medical Teacher, 36(2)*, 139-147.

European Commission (EC). (2004). *ECTS User's Guide*. Brussels: European Commission.

European Commission (EC). (2008). *Explaining the European Qualifications Framework for Lifelong Learning*. Brussels: European Commission.

Genix Ventures (2021). *Examina+*. Accessed from: https://examinaplus.com.

Gibbs, G. (2006). How assessment frames student learning. In: Bryan, C. & Clegg, K. (Eds.) *Innovative Assessment in Higher Education*. London: Routledge.

Hazelkorn, E. Coates, H. & McCormick, A.C. (2018a). Quality, performance, and accountability: Emergent challenges in the global era. In: Hazelkorn, E., Coates, H. & McCormick, A. (Eds.) *Handbook on Quality, Performance and Accountability*. Cheltenham: Edward Elgar.

Hazelkorn, E., Coates, H. & McCormick, A.C. (Eds.) (2018). *Research Handbook on Quality, Performance and Accountability in Higher Education*. Cheltenham: Edward Elgar.

Kuh, G. & Jankowski, N. (2018). Assuring high quality learning for all students: The state of the art in the United States. In. Hazelkorn, E., Coates, H. & McCormick, A. (Eds.) (2018). *Handbook on Quality, Performance and Accountability*. Cheltenham: Edward Elgar.

Liu, L, Wong, E. & Coates, H. (2019). Exploration on the reform of online course operating mode in Chinese universities: Inspiration from OPM provider-university cooperation model in Western countries. *Distance Education and Online Learning, 1*, 122-28.

Measuring and Comparing Achievements of Learning Outcomes in Higher Education in Europe (CALOHEE). (2018). *Measuring and Comparing Achievements of Learning Outcomes in Higher Education in Europe (CALOHEE)*. Accessed from: www.calohee.eu

Medland, E. (2016). Assessment in higher education: drivers, barriers and directions for change in the UK. *Assessment and Evaluation in Higher Education, 41(1)*, 81-96.

Melguizo, T. & Coates, H. (2017). The value of assessing higher education student learning outcomes (editorial). *AERA Open Higher Education Special Topic, 3(3)*, 1-2.

Mislevy, R.J., Almond, R.G. & Lukas, J.F. (2003). *A Brief Introduction to Evidence-centered Design*. Princeton: Educational Testing Service.

Organisation for Economic Cooperation and Development (OECD) (2019). *Trends Shaping Education 2019*. Paris: OECD Publishing.

Organisation for Economic Cooperation and Development (OECD) (2012). *Assessment of Higher Education Learning Outcomes Feasibility, Study Report, Volume 1, Design and Implementation*. Paris: OECD.

Price, M. (2005). Assessment standards: the role of communities of practice and the scholarship of assessment. *Assessment and Evaluation in Higher Education, 30(3)*, 215-30.

Richardson, S. & Coates, H. (2014). Essential foundations for establishing equivalence in cross-national higher education assessment. *Higher Education, 68(6)*, 825-836.

Smarter Learning (2021). Smarter Learning. Accessed from: www.smarterlearning.global

United Nations Educational, Scientific, and Cultural Organization (UNESCO) (2015). *Rethinking education: towards a global common good?* Paris: UNESCO Publishing.

United Nations Educational, Scientific, and Cultural Organization (UNESCO) (2015). Level-setting and recognition of learning outcomes: *The use of level descriptors in the twenty-first century*. Paris: UNESCO.

Wagenaar, R. (2014). Competences and learning outcomes: A panacea for understanding the (new) role of higher education? Tuning Journal for Higher Education, 1(2), 273-302.

Wong, E. (2019). *New Insights into Contemporary Higher Education in the US: Framework of Online Program Management (OPM) providers and its implication for China*. Beijing: Tsinghua University.

Zlatkin-Troitschanskaia, O., Pant, H.A. & Coates, H. (Eds.) (2016). *Assessing Student Learning Outcomes in Higher Education: Challenges and international perspectives. Assessment and Evaluation in Higher Education, 41(5)*, 655-661.

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