

One system to examine them all: Defining the complexities of implementing an institution wide online exam model

Peter Bryant

University of Sydney Business School
Australia

Jacqueline Ruello

University of Sydney Business School
Australia

A significant majority of universities have engaged in piloting or implementing technology enabled forms of examination (online exams) in response to increasing pressures on space, resources and the demands of scale. Informed by analysis drawn from a series of consultative workshops and interviews with over 120 participants including academics, support and professional services staff and senior management at the University of Sydney, this paper will explore the tensions and challenges arising from the institutional demand to determine the requirements for the procurement of a single online exam system to replace the current spread of disparate pilots across the faculties. Using pain points, alleviations and mitigations that are felt within the existing exam system, we will identify two tensions that increase in importance the further any system moves away from the dominant models of exam facilitation and marking using technology.

Keywords: online exams, assessment, institutional adoption of technology, technology enabled assessment

Introduction

Over the last decade, there has been a significant interest by Universities in implementing online facilitation and conduct of examinations (Hillier & Lyon, 2018), which has been aligned with a strategic and pedagogical embracing of the wider suite of tools related to electronic management of assessment (Mayhew, 2018; Walker, Voce, & Jenkins, 2016). Considering the advancing technological landscape, opportunities for adopting technology in the implementation of assessment have become extensive and widely available through vendors (e.g. Cerimagic & Hasan, 2019; Wadley, Weaver, Curry, & Carthon, 2014). With the significant increase in student numbers experienced by many institutions creating issues of scale and sustainability for existing assessment practices, there is an increasing pressure to extend pedagogical processes and assessment to use technology and the devices students own themselves (Boitshwarelo, Reedy, & Billany, 2017; A. E. Fluck, 2019; Newland & Martin, 2016). Drawing on the insights gained from an extensive consultation exercise with academic and professional services staff conducted at the University of Sydney in 2019 (as part of the University approach to determining the feasibility of acquiring an online exam platform), this paper will interrogate some of the critical issues and challenges that emerge as institutions consider, pilot and evaluate the efficacy of moving whole or part of the exam process to an online environment, as an alternative assessment modality to the traditional pen and paper-based exam.

Contested definitions of online exams

Exams are a contested and increasingly 'controversial' mode of assessment in higher education, with an increased focus on considerations such as authenticity of assessment and the use of more progressive, iterative assessment models (see e.g. Williams & Wong, 2009). There is also considerable debate in the pedagogical literature about the future of 'traditional' exams in an authentic assessment environment (e.g. Rojas Serrano, 2017; Wren, Sparrow, Northcote, & Sharp, 2009). However, for many institutions and discipline contexts they remain the dominant form of assessment, that some authors assert are critical to ensuring academic integrity and honesty and offer a fair measure of student understanding and performance (e.g. McCabe, Treviño, & Butterfield, 2001; P. Singh, Thambusamy, & Druckman, 2016). In the context of this study, we did not evaluate the efficacy of continuing to use exams in our faculties, although authenticity of assessment and academic integrity are critical centerpieces of the University education strategy. If those issues came out during the workshops then that would form part of our findings.

Regarding online exams, the facilitation and conduct of exams using technology is not a recent concept, with some examples of the uses of computer mediated assessment dating back almost 100 years with references to and exhortations about the benefits and dangers of computer or electronic mediated forms of examination (McLuhan, 1970; Osler, 1913; Suppes, 1966, for example). In the modern era, there has been two narrative themes running parallel in the literature. The first takes a holistic or broad approach to defining technology enabled examinations

broadly, whilst the second narrative defines specific constraints and boundaries to delimit their analysis to specific practices and approaches. *Table 1* summarises these two narratives through some of the critical studies in the area on online exams.

Table 1: Definitions on technology enabled examinations in the literature

Broad	Specific
<i>'use of computers for testing'</i> (Nardi & Ranieri, 2019, p. 1496).	<i>'a timed, supervised, summative assessment conducted using each candidate's own computer running a standardised operating system'</i> (A. Fluck & Hillier, 2017; A. E. Fluck, 2019; Hillier & Lyon, 2018).
<i>'application of computers to assessment processes'</i> (Davies, 2010, p. 56)	<i>'the use of any technological device to create, deliver, store and/or report students' assessment marks and feedback'</i> (Appiah & Van Tonder, 2018, p. 1454).
<i>'the use of information technology in conducting assessment'</i> (U. G. Singh & de Villiers, 2017, p. 164).	<i>'Electronic examination (e-examination) is intended to serve as summative (final) assessment - e-exam - in order to define the evaluation - grade - for a course'</i> (Kuikka, Kitola, & Laakso, 2014, p. 2).
<i>'E-assessment (based on JISC, 2007) is defined as the use of information and communication technology to mediate any part of the assessment process'</i> (Tomas, Borg, & McNeil, 2015, p. 589).	

As the purpose of our study was primarily organisational in that we were seeking to define the requirements of a technology enabled exam solution, the specificity of the types of device, the software or cloud solution or even the degree to which technology intervened in the process (owned by the University of the student) was not of critical importance. We focused on identifying the issues arising from how the current exam system was coping with significantly increased student numbers and a substantially more complex timetabling challenge resulting from student flexibility and unit choice, especially at an undergraduate level.

Context and methodology

In response to a growing slate of pilot projects testing various aspects of online exams using various commercial platforms across the University of Sydney, four faculties came together with the central Information and Communications Technology division and the Office of the Deputy Vice Chancellor Education to undertake a consultation process with academics, senior leadership and professional services. The aim of the consultation process was to identify staff pain points with the current exam system that might be alleviated by using technology to deliver exams, as well as identifying any potential benefits arising from the benefits offered by technology that could not be leveraged from pen and paper exams.

In early 2019, we ran a series of structured consultative workshops with the Faculty of Medicine and Health, The University of Sydney Business School, the Faculty of Health Sciences, and the Faculty of Science; each of which comprised of self-selected and nominated staff who had an interest or expertise in the conduct of exams. In total, 124 staff attended these four workshops which ran over three months. These workshops identified significant experiential and predictive insights into the conduct of exams at the University, all of which were recorded and then coded on the fly as part of a guided discussion and further analysed after the workshop. We used three broad categories (pain points that were alleviated through technology, pain points that were mitigated through technology and affordances that were created through technology) to help bring together the results of the consultation and provide a frame for better defining the problem that we were trying to solve by implementing online exams at the University. Each workshop allowed participants the opportunities to consider (through group and collective discussions) the issues with the current processes and procedures for exam-based assessment (both pen and paper, and online). As these workshops were based in faculties, the perspective of the people in the University that supported students in their learning was critical. We conducted one-to-one interviews with central services staff such as Disability Services, Counselling and Psychological Services and Indigenous Support Services to identify how practices such as reasonable adjustment for physical disability, the impacts of the digital divide and the capacity for technology to impact on mental wellbeing could be managed through the implementation of online exams.

The data from this project was collected primarily to inform the decision-making process at the University. This paper will use the aggregated and collective insights that arose from the coding of this data as the research question discussed here was not central to the consultation process explicitly (however tacitly important it became).

Moving away from central tendency – two tensions arising from differing schemas of online exams

As stated earlier, the purpose of this project was to interrogate the feasibility of procuring an institutional wide online exam system. We had hoped that these workshops would provide critical information to kick-off the procurement process with a business case outlining the benefits and costs of online exams. What emerged were more fundamental pedagogical and technological tensions that were centred on the absence of an agreed or shared understanding of what constituted an exam at the University. There was a lack of an agreed frame of reference or common rubric or typology influencing how the participants evaluated the effectiveness of exams in their disciplinary or functional contexts. As we commenced each workshop, we realised that our own understanding and definition of online exams was substantially different from those of the participants within and between groups. Each participant approached their engagement with the consultation with very clear experiences through which they defined online exams (either as the solution or the problem). Despite clear instructions at the start, vendor names and platforms were frequently mentioned by participants, sometimes conflating the functionality and benefits of online exams with those of a specific platform. Over the course of each workshop, participants narratives and stories weaved discontinuously between different pedagogical, operational and policy contexts, with participants within workshops often disagreeing that something was a pain point or even that it was part of the process of conducting exams. It was clear from the workshops that, like pen and paper exams, there are multiple modes of delivery embedded within the broad conceptual definition of online exams, much of which emerged from their lived experiences with specific platform or software or with a type or mode of exam (such as fully invigilated on campus, multiple choice tests, take home exams, open book exams, viva or oral exams). There was however, a dominant mental schema present in many of the workshops, represented by the traditional large-scale conduct of a 'final' exam, organised and ran by a central exams support unit, invigilated by people, with all students undertaking the exam at the same time under examination conditions.

When we pressed the participants on different modes of online exams; the further the discussion moved away from the modes of online exams that replicated their mental schema of a final exam, the more diverse and disparate their understanding and perceptions became. In some ways, the participants were anchored by their central perceptual tendency, where if pushed into concepts or frames they were unfamiliar with, they reverted back to interpreting or modelling their understanding through their own experiential schema or through the common attributes of the schema they shared with others (an example is the way academic integrity could be used to explain the entire exam process from design to marking and feedback). In the context of the challenges outlined earlier, the identification of a single institutional system in this context is problematic at best.

The consultation process exposed some of the tensions and complexities arising from how an institution might determine and evaluate the requirements and benefits that can come from implementing a single institutional system for online exams. The first of these tensions was that participants focused on the lowest common denominators of exam conduct as a way of finding common ground between their divergent experiences and knowledge. The only way the participants could imagine how a single institutional solution for online exams would work, was to evaluate the requirements of any potential system through the lens of these common but generic requirements that would need to present in any online exam systems (such as proctoring and invigilation, marking and feedback and the notion of typing exams instead of writing). This meant that participants found it difficult to imagine or predict the innovation, enhancement or transformation of exams using technology

The second tension was explicitly raised by the staff who supported students to participate in exams. The further discussion moved past the use of fixed computers in synchronous delivery modes to conduct exams, they believed that their capacity to support students requiring reasonable adjustment for disability (such as extra time for the exam, writing support for those with difficulty using their hands or assistance for those with visual impairment, for example) became increasingly compromised. Similarly, when BYOD was raised as a mode of online exam, they noted that students from low socio-economic backgrounds or indigenous students may have financial difficulties in purchasing devices which operate at standards equal to the market leading devices. This digital divide was also evident in the increasing technological complexity and expertise required to engage with vendor owned platforms, install bespoke software or engage security or integrity protocols such as locked down browsers at a student or institutional level.

Conclusions

Two critical factors for how institutional systems are evaluated in higher education are how well it integrates with the other University systems and how effective is it for its designed purpose across all the complex ecosystem of faculties, disciplines and student profiles. As Martin Weller pointed out in 2007 discussing the Virtual Learning Environment, institutions are faced with two choices ‘...The first is to develop a system that is broad enough to meet the needs of all students, and the second is to develop a range of tools that meet the needs of specific audiences’ (Weller, 2007, p. 9). This project was initiated because the University identified between six and ten separate online exams projects running in small contexts across the faculties. None of them were centrally funded or supported, there was little practice sharing between projects and no explicit consideration of scale or transferability. The default position in other learning technology systems such as the VLE and the lecture recording system is do as Weller suggests and find a single system, whereas the practice on the ground defaulted to the second option he proposes. The challenges of identifying an institutional wide online exam at the University of Sydney were manifestly clear in our data..

Where we were unable to elicit an explicit exposure of the mental schema used by respondents to evaluate the relevance and criticality of the pain points with the current exam systems (either pen and paper and/or technology pilots) there remained the possibility that these images were sticking points for any potential institutional solution. They would represent evaluation hurdles that may be very difficult to define and challenging to expose to any procurement process, with any solution having to be a perfect fit for the unexposed mental images of online exams. Another complexity that arises from these schemas is that they may limit the ambition of what is possible through the deployment of an online exam solution. By that we mean that any system might be considered through the lens of how it provides replacement opportunities for students and staff (replacing handwriting with typed scripts), or enhancement opportunities (such as affording more authentic use of multimedia, images or sounds for example) or truly game-changing opportunities where the whole notion of exam based assessment is challenged and transformed through the use of technology (the use of AI, machine learning or gamification for example). The one size fits all mantra of both procurement and the single vendor solution can struggle to provide for all of those opportunities simultaneously, once again leading the determination of operational requirements to be defined at the level of the lowest common denominators rather than in the framework of aspiration and transformation.

The tensions between delivering a system that can be realistically implemented within the ICT infrastructure, delivering within budget and with a reliability and security expected of critical University systems and the pedagogical requirements of a diverse, multi-disciplinary university are demonstrable and real. The compromises that need to be made between pedagogical and educational ambition and the realities of the one system to examine them all significantly impact on the ambition and benefits that can be realised from transitioning between the existing pen and paper system and online exams. These tensions may also open up new and challenging issues around contract cheating, the integrity of the degrees we award and how we best support widening participation and student achievement and retention in our programs. In the forest of vendor solutions, feature promises and collegiate testimonials, can we as an institution identify what we actually want from an online exam solution, identify what we are going to want in five years’ time and whether any solution presents a roadmap to get there?

It will be a critical challenge for the next phase of research (expanding the interviews to other institutions and to students) to be able to better identify the explicit assumptions and mental schemas residing in the perceptions of key decision makers in institutions. One important missing voice in this first stage was that of the students. It will be a key question to address going forward to identify what benefits and affordances emerge for students as universities move to online exams. There is potential for the same tensions to emerge, but perhaps not necessarily around the conduct of online exams but in their own lived experiences with the tools and technologies that facilitate online exams (experiences of laptop batteries running out, Wi-Fi connectedness difficulties or privacy and security concerns, for example) and their own self-efficacy in terms their confidence with the use of technologies to facilitate exams.

References

- Appiah, M., & Van Tonder, F. (2018). E-Assessment in Higher Education: A Review. *International Journal of Business Management and Economic Research (IJBMER)*, 9, 1454-1460.
- Boitshwarelo, B., Reedy, A. K., & Billany, T. (2017). Envisioning the use of online tests in assessing twenty-first century learning: a literature review. *Research and Practice in Technology Enhanced Learning*, 12(1), 16.
- Cerimagic, S., & Hasan, M. R. (2019). Online Exam Vigilantes at Australian Universities: Student Academic Fraudulence and the Role of Universities to Counteract. *Universal Journal of Educational Research*, 7(4), 929-936.

- Davies, S. (2010). Effective assessment in a digital age. http://www.jisc.ac.uk/media/documents/programmes/elearning/digiassass_eada.pdf.
- Fluck, A., & Hillier, M. (2017). *eExams: Strength in diversity*. Paper presented at the IFIP World Conference on Computers in Education, Dublin, IR.
- Fluck, A. E. (2019). An international review of eExam technologies and impact. *Computers & Education*, *132*, 1-15.
- Hillier, M., & Lyon, N. (2018). *Student experiences with a bring your own laptop e-Exam system in preuniversity college*. Paper presented at the Open Conference on Computers in Education.
- Kuikka, M., Kitola, M., & Laakso, M.-J. (2014). Challenges when introducing electronic exam. *Research in Learning Technology*, *22*(1).
- Mayhew, E. (2018). Implementing electronic management of assessment: four key barriers faced by higher education providers moving to online submission and feedback. *Research in Learning Technology*, *26*.
- McCabe, D. L., Treviño, L. K., & Butterfield, K. D. (2001). Cheating in academic institutions: A decade of research. *Ethics & Behavior*, *11*(3), 219-232.
- McLuhan, M. (1970). Education in the electronic age. *Interchange*, *1*(4), 1-12.
- Nardi, A., & Ranieri, M. (2019). Comparing paper-based and electronic multiple-choice examinations with personal devices: Impact on students' performance, self-efficacy and satisfaction. *British Journal of Educational Technology*, *50*(3), 1495-1506. doi:10.1111/bjet.12644
- Newland, B., & Martin, L. (2016). Electronic Management of Assessment 2016: a HeLF Survey Report.
- Osler, W. (1913). Examinations, examiners, and examinees. *Dublin Journal of Medical Science (1872-1920)*, *136*(5), 313-327.
- Rojas Serrano, J. (2017). Making Sense of Alternative Assessment in a Qualitative Evaluation System. *Profile Issues in Teachers Professional Development*, *19*(2), 73-85.
- Singh, P., Thambusamy, R., & Druckman, Z. (2016). Insidious, Invasive, Invisible: Academic Dishonesty and ongoing assessments in higher education. *The European Journal of Social & Behavioural Sciences*, *17*(3), 2154.
- Singh, U. G., & de Villiers, M. R. (2017). An Evaluation Framework and Instrument for Evaluating e-Assessment Tools. *International Review of Research in Open and Distributed Learning*, *18*(6), 164-185.
- Suppes, P. (1966). *The uses of computers in education*: Freeman.
- Tomas, C., Borg, M., & McNeil, J. (2015). E-assessment: Institutional development strategies and the assessment life cycle. *British Journal of Educational Technology*, *46*(3), 588-596.
- Wadley, M., Weaver, S. B., Curry, C., & Carthon, C. (2014). Pharmacy students' perceptions of ExamSoft® as the primary assessment tool in an integrated therapeutics course. *Currents in Pharmacy Teaching and Learning*, *6*(6), 815-821.
- Walker, R., Voce, J., & Jenkins, M. (2016). Charting the development of technology-enhanced learning developments across the UK higher education sector: A longitudinal perspective (2001–2012). *Interactive Learning Environments*, *24*(3), 438-455.
- Weller, M. (2007). *Virtual learning environments: Using, choosing and developing your VLE*: Routledge.
- Williams, J. B., & Wong, A. (2009). The efficacy of final examinations: A comparative study of closed-book, invigilated exams and open-book, open-web exams. *British Journal of Educational Technology*, *40*(2), 227-236.
- Wren, J., Sparrow, H., Northcote, M., & Sharp, S. (2009). Higher Education Students' Perceptions of Effective Assessment. *International Journal of Learning*, *15*(12).

Please cite as: Bryant, P. & Ruelo, J. (2019). One system to examine them all: Defining the complexities of implementing an institution wide online exam model. In Y. W. Chew, K. M. Chan, and A. Alphonso (Eds.), *Personalised Learning. Diverse Goals. One Heart. ASCILITE 2019 Singapore* (pp. 370-374).