

6 **Traditional Exams, 21st Century Employability Skills and COVID-19**

Disruptive Opportunities for Rethinking Assessment Design in Higher Education

Andrew Kelly, Catherine Moore, and Emma Lyons

Abstract

High-stakes examinations have been a university tradition for nearly two centuries, due at least in part to a widespread perception that they offer validity, objectivity, and reliability in assessing learning. The disruptive COVID-19 crisis, however, has triggered shifts in thinking over whether university exams in an online environment hold the same rigor and authenticity—or even whether they still serve as a valid form of assessment for preparing students for post-graduate employment. This chapter examines those shifts against the backdrop of COVID-19 and examines the relationship between exams and enhancing graduate employability through three key skills: problem-solving, creativity, and critical thinking. Taking a global perspective, it reviews the current literature on these topics and considers alternative forms of assessment using practical examples that may provide more valid methods of improving post-graduate employability outcomes through more authentic real-world assessments. It ultimately argues that universities must seize the opportunities created by COVID-19 for widespread assessment reform and use this momentum for setting tasks that more closely reflect the types of skills needed for work in the post-pandemic world.

Keywords

assessment, COVID-19, coronavirus, employability skills, exams, graduate employability, graduate outcomes

Introduction

Four years before the global outbreak of the COVID-19 pandemic, the World Economic Forum's (WEF) *Future of Jobs Report* predicted the top ten

employability skills for 2020. Through surveying senior executives in the world's largest employers, the report concluded that the top three desirable workplace skills at the start of the next decade would be “complex problem-solving, “critical thinking,” and “creativity.” “Emotional intelligence” and “cognitive flexibility” also featured 7th and 10th respectively on the 2020 list; both of which were not even listed as top priority skills in 2015 (World Economic Forum, 2016). While those surveyed certainly could not have predicted a pandemic such as COVID-19 would occur in 2020 and the significant disruption it would have on the global workforce, it is indeed telling that recent assessments of the key employability skills needed for a post-coronavirus world align closely with those earlier predicted skill demands (Bravery & Tomar, 2020; Marr, 2020). In short, the 2016 WEF predictions were largely correct: each of these employability skills have been incredibly important during a time of rapid change and instability worldwide.

During the global response to COVID-19, the role of universities in preparing graduates to develop these skills has become more critical than ever before. The 2016 WEF report had argued that educational institutions such as universities required a “skills evolution” because many of its continued “20th century practices” would not meet the needs of the future labor market (World Economic Forum, 2016). One of the most common forms of these ongoing practices are exams: an individual summative assessment that normally occurs in an invigilated face-to-face environment. High-stakes examinations have been a university tradition for nearly two centuries, due at least in part to a widespread perception that they offer validity, objectivity, and reliability in assessing learning. Yet, mandatory government social distancing requirements brought about by COVID-19 forced universities to either shift the facilitation of exams into an online environment or design alternative forms of assessment altogether (Watermeyer, Crick & Knight, 2020). These revisions have raised further questions over whether traditional university exams still serve as a valid form of assessment for preparing students for employment after graduation (Alexander, Cutrupi & Smout, 2019; Efu, 2019).

In the context of COVID-19 and the subsequent global demand for new employability skills, this chapter critically analyses university exams and their connection to post-graduate employability. Taking a global perspective, it reviews the current literature on exams and enhancing employability of graduates by focusing on the top three listed WEF report skills: problem-solving, creativity and critical thinking. It also considers alternative forms of assessment using practical examples that may provide more valid methods of improving graduate outcomes in an increasingly competitive and digital world. The chapter then focuses on how universities may be able to, and indeed already have, adapted assessments to develop the key aspects of an employability mindset that incorporates these skills. In short, this chapter explores the possibilities arising from this surge of disruptive innovation in higher education assessment. Through this exploration, it argues that universities must seize the opportunities created by COVID-19 for widespread assessment reform and use this momentum for setting tasks that more closely reflect the types of skills needed for work in the post-pandemic world.

Employability in the COVID-19 World: Problem-Solving, Creativity and Critical Thinking

The COVID-19 pandemic had an unprecedented impact on global employment. Using a comparative population to employment ratio, there were significantly more jobs lost worldwide in early 2020 than the 1930s Great Depression (Coibion, Gorodnichenko & Webber, 2020). This recent job loss also occurred twenty times faster. For instance, an April 2020 poll showed that a third of workers in Canada and the United States reported that they had lost at least half of their income during the peak of the crisis. Similar trends occurred worldwide, with significant income loss reported by approximately one quarter of polled respondents in the United Kingdom and almost half of those polled in China (Bell & Blanchflower, 2020). Most job losses occurred in lower-skill roles such as those found in retail, tourism, and hospitality, while industries that were able to remain operational despite mandated government restrictions had to change work practices significantly. School classes, business meetings, and medical consultations all started occurring online at record rates.

By necessity, rapid response to this disruption required key employability skills such as problem-solving, creativity and critical thinking. These skills will be similarly crucial as the world continues to respond to the COVID-19 pandemic and its long-lasting impact on future work practices. As a result, it follows that those who develop these skills while at university and can apply them in practice will be best placed to find meaningful employment upon graduation. Many factors contribute to employability, which this chapter defines as the range of skills and personal attributes that recent graduates need to possess in order to find meaningful employment. It includes a strong foundation of discipline-specific knowledge and skills, and the cognitive, interpersonal and intrapersonal skills that facilitate productive working relationships. The categories often used to define skills for employability can be referred to as “hard skills” (including knowledge and technical proficiency) and “soft skills” (such as interpersonal skills and personal qualities; Sessanga & Mussisi, 2019). These latter traits are difficult to measure in traditional university assessments, yet they are essential components of an employability mindset. This mindset is also referred to in the literature as a “professional purpose mindset,” characterized by the amalgamation of self-awareness, career management, confidence, and flexibility (Bates et al., 2019). It fosters adaptability in graduates to withstand the type of volatile labor market conditions that are predicted, and that can be extrapolated to a post-COVID-19 world.

Employers repeatedly express a preference for employees with a “can-do” attitude (Fraser et al., 2019; Osmani et al., 2019), referring to people that are confident and willing to respond constructively to new problems. The important role of universities in fostering an overall mindset for employability is crucial in framing assessment for employability. Bates et al. (2019, p. 7), for instance, contend that due to an increasingly dynamic future job market, universities should focus on fostering an employability mindset in students via four elements (curiosity, action, collaboration, growth) and three domains (self and social

awareness, navigating the world of work, and building networks). Each of these elements and domains have clear links to problem-solving, creativity and critical thinking. For example, curiosity is a necessary precursor to thinking about creative ways to solve problems. Similarly, in order to think critically about a work-related problem, it requires an awareness of one's own social context and the impact of relationships that exist within professional networks.

Real-world problems such as COVID-19 are situated in an ever-changing environment, so solving them also requires an ability to anticipate potential difficulties and evaluate the impact of unforeseen events. Being able to work with ambiguity and uncertainty requires cognitive flexibility and resilience, which are both qualities highly valued by employers (Bridgstock, 2019; Seow, Pan & Koh, 2019). Solving real-world problems also requires a combination of critical and creative thinking, emotional intelligence, and cognitive flexibility to generate a range of potential solutions. Future graduates' success is heavily pinned on the ability to use problem-based learning in collaborative scenarios whereby "critical thinking, novel and adaptive thinking ... [and] social intelligence" combine to prepare students with transferable skills for the future (Tuffley, 2017, p.11). In other words, addressing real-world problems requires a willingness to engage with uncertainty and recognition that potential solutions will never be completely correct or incorrect. Adapting to such uncertainty and focusing on solving problems during critical moments was essential in responding to COVID-19 effectively. Leaders within organizations that successfully oversaw flexible changes to processes and practices based on government health restrictions were better placed to thrive in challenging circumstances.

Creativity is another valuable employability skill. Organizations are constantly seeking employees who display traits such as entrepreneurialism, initiative and innovativeness in order to create new products and improve services (Bridgstock, 2017). Employees that can demonstrate these types of traits were especially important at the height of the COVID-19 pandemic in early 2020, as the situation was largely unprecedented and required rapid responses to meet government health restrictions. For future students working in a post-COVID-19 world, this means that university learning activities need to develop higher-order thinking skills like creativity in order to be more competitive in the graduate labor market. Such activities teach students to embrace a range of possibilities, to become comfortable with uncertainty, and to remain open-minded and curious. In short, openness to questioning and idea sharing, as well as the flexibility to err and make corrections, will cultivate both creativity and professional resilience in students' future working lives (Sessanga & Mussisi, 2019). With these inclusions, students will learn to maintain an open mind and adapt to changing workplace practices, as well as be able to constantly analyze and reinterpret the world as the threat of COVID-19 gradually subsides.

Reframing and opening oneself to multiple viewpoints through cognitive flexibility not only cultivates creativity and innovation, but also allows learners to unbed and examine their own and others' assumptions. This ultimately leads to another core employability skill: critical thinking. Organizations

seek employees that not only have interpersonal skills, but also the capacity to analyze problems from multiple perspectives critically (Hart Research Associates, 2015). Fields (2019) acknowledges the challenges in developing this kind of cognition amongst students in tertiary education, yet several strong employability traits can emerge through developing critical thinking skills. These include effective decision-making, communication, and investigative research skills. Moreover, the acceptance of ambiguity and a willingness to maintain an open mind whilst critically weighing up evidence will likely become increasingly important in order to discern credible information from a saturation of online content (Sessanga & Mussisi, 2019). This involves constant comparison, juxtaposition, and synthesis of incoming data (critical appraisal) in order to reframe issues and innovate (creatively problem solve). Therefore, the relationship between problem-solving, creativity, and critical thinking are inherently interconnected.

COVID-19 and University Exams

When COVID-19 hit, universities were faced with the challenge of how to move traditional on-campus individual invigilated assessments to an online environment. Transferring exams to an online environment with access to limitless internet resources requires a change to the invigilation process or deployment of deterrent measures against cheating. Migration of traditional examinations to an online environment, however, can be much more complex and resource-intensive than often anticipated (Allan, 2020). Students need precise communication about preparation, such as clear instructions for accessing the exam itself and as well as technical support for any ad-hoc issues that may present during completion (Cramp et al., 2019). Despite these challenges, many universities still decided to move exams to an online environment at the height of the pandemic. In a survey of 312 higher education institutions worldwide, an Educause ‘QuickPoll’ found that 54% of respondents were using a form of online proctoring during early to mid-2020. It also found that another 23% of institutions were still considering using them for end of semester exams during that same period (Grajek, 2020).

In the higher education context, responses to the pandemic were not consistent globally. Growth rates of the COVID-19 infection were higher in some countries than others by mid-2020, and this necessitated varied approaches to teaching and learning practices depending on the context in which an institution was operating. Where the risk of COVID-19 was very low, some institutions did not need to respond significantly. In areas of high risk, however, universities and other higher education providers undertook rapid curriculum redesign in order to teach and assess in an entirely online environment. In a survey of 20 countries from the Americas, Europe, the Middle East and Asia, the move to online teaching and assessment during the first half of 2020 occurred most commonly in developed countries such as the United States, Germany, and Australia. However, despite these trends, there were still significant variations in the number of COVID-19 cases

reported per one million population between these countries and others (Crawford et al., 2020). This suggests that the risk of the COVID-19 infection as well as the capacity in which an institution could deliver online teaching both contributed to whether face-to-face exams were replaced with alternative assessments during the initial response to the pandemic.

For some institutions, the unanticipated challenges of migrating traditional examinations to an online environment provided an impetus for universities to explore alternative forms of assessment. As Fuller et al. (2020) described, the disruption caused by COVID-19 presented genuine opportunities to explore different assessment designs that focused on higher order thinking. For instance, an Australasian Council on Open, Distance and e-Learning (ACODE) survey (Sankey, 2020) found that most institutions ran alternative forms of assessment to some of their exams and chose a range of solutions to run more formal examinations, either in a proctored or unproctored way. Some chose to manually proctor exams using internally employed tutors working through Zoom or similar platforms, whereas others used different measures such as test banks and keystroke information to improve the integrity of online tests (Clark et al., 2020). Another approach was to use alternative solutions such as assessment deferral, submission mode changes, online presentations, and virtual simulations. Despite these shifts occurring rapidly, alternative assessments such as presentations and simulations offered new opportunities for authentic work that can improve future employment prospects. Compared to writing answers individually during a timed and invigilated exam setting, students completed tasks that more closely resembled the type of work they might perform in the workplace after graduation.

By transforming traditional high stakes examinations into more authentic tasks, universities were unexpectedly able to drive learning behaviors that enhanced employability. To be sure, good assessment tasks must have integrity (validity and student identity verification) and authenticity (both relevant and rigorous). However, traditional high-stakes university assessment tasks have prioritized integrity over authenticity. In this context integrity prioritizes student identity verification by seeking to ensure that the work on which student achievement is judged and certified has been done by the individual purporting to have done it. The notion that traditional examinations in timed and invigilated settings offer the best assurance of integrity has led to a predominance of this form of assessment. This is understandable as doubts cast on the integrity of university assessments threaten the reputation of universities and their graduates (Slade, Rowland & McGrath, 2019). Universities tend to pride themselves on the rigor of their assessment regimes, but authenticity in terms of relevance of assessments to students' current or future careers has been a lower priority (Care & Kim, 2018).

COVID-19 ultimately disrupted this status quo of traditional university assessment. Due to mandatory social distancing restrictions which prevented conducting on-campus invigilated exams, the pandemic prompted a proliferation of alternative authentic online teaching and assessment

practices (Crawford et al., 2020). This transformation of assessment has required a concurrent reshaping of learning activities and may well change the landscape of university education. Boud (2020) suggests that previous conventional assessment practices cannot be assumed to continue to meet the needs of the present and encourages reflection on whether current assessments are promoting the type of learning behaviors that will support future success for our graduates. Traditional examinations may be suited to certifying discipline-specific knowledge, yet they are unlikely to be effective at evaluating key employability skills such as problem-solving, creativity and critical thinking. Even before COVID-19 hit, the question was already being asked: does current university assessment still pass muster (McKie, 2019)?

High stakes exams predominantly test students' ability to reproduce knowledge in the form of discrete facts, routine computational formulae and predetermined procedures. This is undoubtedly useful, as factual and procedural knowledge are necessary elements in the exercise of higher order skills. However, it is not sufficient for enhancing the capacity of graduates to solve complex problems, develop creative solutions, and to cultivate critical awareness around both these respective aspects. The proportionately heavy weighting of exams toward final grades also means that preparation for such exams becomes the default curriculum, even when other intended learning outcomes are stated. This problem of a narrow focus on factual and procedural knowledge is exacerbated when preparation for such exams shapes and pervades all teaching and learning activities. This influencing effect has been well documented as "the washback effects of high-stakes exams" (Tan, 2020). There is, indeed, a growing realization of the need to transform exams by including elements that reflect authentic "world of work" situations in order to ensure that assessment regimes enhance graduate employability. Online examinations can be tested via scenario-based or open-ended questions, simulations using discipline-specific professional software, and the use of multimedia, thus providing authentic assessments that prepare students for their working life.

Exam Alternatives: Practical Examples

Traditional exams in timed and invigilated settings do not appropriately reflect the contexts that students will be performing tasks after leaving university. A more authentic alternative to these forms of exams is to design them as open book, in which students have either full or limited access to a range of resources such as websites and textbooks while completing an assessment. In this way, it more closely resembles real-world work tasks such as writing reports. In exploring open book exams as an alternative, Teodorczuk, Fraser and Rogers (2018) investigated the impact of medical teachers complaining about a full curriculum. Open book exams were trialled, and it was concluded that learners became less reliant on memorizing facts and achieved deeper learning of higher-level outcomes. The redesign also led to tasks that were

more authentic to clinical practice where information is freely available during consultations. The nature of this assessment stress was closer to the inherent stressors that students would encounter in their future practice, thereby making the task more useful in developing resilience that would support students in future work.

A key challenge of simply migrating traditional face-to-face examinations to an online open book exam, however, is the extent to which academic integrity can be upheld. Although cheating also exists in the traditional assessment environment, it can be amplified in the online setting when the focus of the examination is demonstrating factual and procedural knowledge (Akimov & Malin, 2020). However, the move to online examinations can be used to transform examinations, testing higher-order skills via scenario-based or open-ended questions. Alternatively, exams can be reconceptualized as simulations that provide authentic assessment contexts whereby students apply the learnt content knowledge to theoretical case studies in a relevant work environment. It also offers opportunities for online oral examinations, in which students deliver a presentation or respond with applied knowledge to questions via videoconference or recording (Akimov & Malin, 2020). This approach improves assessment integrity and more appropriately reflects the type of skills graduates need to develop in the digitally competitive employment market.

How, then, can tertiary educators ensure graduates develop the “can-do” attitude that makes them confident and willing to deal with problems or new tasks? At least in part, building student confidence in solving complex problems creatively can be nurtured through setting clear expectations of assessment tasks and providing constructive feedback. In assessment, it is common practice to clearly define all task requirements and include clear marking guides that identify criteria and standards of performance against which work will be judged. Students now expect, even sometimes demand, such clarity in all assessments. While clearly defined assessments can be a useful exercise in applying knowledge and exercising critical and creative thinking in a study context, they only reflect a small dimension of the challenges that graduates will be expected to deal with once they enter the workplace (Boud et al., 2018). There are no marking criteria when completing tasks in a workplace. At times, even clear communication about expectations can be absent. This means that some tertiary learning activities and corresponding assessments also need to be designed to consider situations in which there is no obvious correct answer or the parameters of answering a question can change over time. Traditional exams are not well equipped to provide this sort of learning experience.

Engaging students in case studies that are real and ongoing (not resolved) offers a unique opportunity to develop critical thinking and innovative problem-solving skills. One practical example are dynamic case studies, in which the context and parameters of an assessed situation can change over time. This assessment model has been implemented with business students

at an Australian university. Students are assigned a high profile Australian public company, and in groups they analyze their business, evaluate real scenarios, and engage in robust discussions to make predictions about the likely impact of key decisions (Moore & Chandra, 2019). As the semester develops, the context of these decisions changes as the companies' positions changes, and as a result, students need to conceptualize alternative forms of action. They also need to compare their recommendations against what the business actually did and reflect on the accuracy of their predictions. The course engages students in audit and risk assessment processes, and ethical decision making through contemporary cases. Unlike traditional case studies, students cannot "google" how the case unfolded at the time they need to make, and advocate for, their decisions.

Problem-solving requires both critical and creative thinking. Real-world problems are generally fuzzy and ill-defined, requiring an ability to first clearly define the problem before attempting to address it. Another interesting example of this type of alternative assessment approach is the International Mathematical Modelling Challenge (IMMC). In this annual competition, teams from around the world develop an original mathematical model that demonstrates how stores should arrange products during a flash sale in the most optimal way to minimize damage to merchandise. The challenge tests students' logical thinking and synthesis in a pressured real-world setting, as well as their collaboration and communication skills (Russell, 2020). While the IMMC is organized in secondary school settings, it could also be applied in a higher education context. The global challenge requires the application of mathematics to solve real-world situations and allows the use of freely available material from the internet. In contrast to recalling knowledge in an exam, the IMMC more closely resembles the types of tasks that future mathematicians, marketers and business analysts would be completing in a workplace situation.

Similar real-life examples can be found elsewhere, such as cases in which students solve problems in specific scientific domains that comprise of a few interconnected and complex variables. The enormous potential of this approach was recognized in the Programme for International Student Assessment (PISA) in 2012 (OECD, 2014; Scherer, 2015). In this example, students were presented with a system (i.e. the problem environment) that simulates a specific scientific concept (such as climate control). Their first task was to generate knowledge about this system of variables and their relations by testing how changes in the input variables affected the system. Students represented their mental model about these relationships in a path diagram. Their second task was to apply this knowledge in a problem situation which allowed for incorporating interactive, dynamic, and uncertain elements into the problem environment, but still provided sufficient psychometric characteristics in terms of reliability and validity (Greiff, Wüstenberg & Funke, 2012). Consequently, students needed to adaptively respond to dynamic changes in the problem environment and critically analyze whether

proposed solutions are viable. In other words, students had to prepare for unexpected results and innovate alternative solutions as a response. This type of assessment is very difficult to create in a traditional exam environment.

Future Possibilities

In the tertiary sector, the disruption and uncertainty brought about by COVID-19 has offered opportunities to rethink types of assessments and their role in developing employability skills. The restructuring of traditional high-stakes assessment formats into more collaborative and real-life case studies, such as the examples presented in this chapter, offers opportunities to build professional resilience in the face of future uncertainty. They also facilitate greater development of problem-solving, creativity and critical thinking; all of which were top projected employability skills in the 2016 WEF Report. COVID-19 and the resulting online adaptation and assessment reinvention at universities has inadvertently accelerated this shift toward enhancing the profile of flexible thinking styles and the aptitude for creative solutions.

Although COVID-19 has certainly changed life, learning, and work as they have been collectively known, its long-term impact may be characterized by the way it has accelerated some trends that were already underway. This includes increasing moves toward digital business operations and the transformation of university assessments to more authentic tasks (Grajek & Brooks, 2020). COVID-19 has unwittingly provided a view into the potential of online learning, teaching, and assessment to provide an employability-focused platform for students. Not only is there more potential for linkages to be created between assessment and work readiness in terms of the key skills discussed in this chapter, but there is also the opportunity to better equip students with the digital and information literacy needs of the future.

Universities now have an impetus to adopt alternative exam assessments beyond their forced introduction due to COVID-19. Given the unpredictability and need for adaptability during the pandemic, future employers will be looking for graduates that can adapt, think critically about problems, and find creative solutions. As this chapter explored, alternative assessments such as open book tasks, simulations, collaborative problem-based tasks, and dynamic case studies can provide more authentic ways for students to develop these skills and find meaningful employment upon graduation. Higher education institutions and their respective educators must seize the opportunities created by COVID-19 for widespread assessment reform and use this momentum for setting tasks that more closely reflect the types of skills needed for work in the world outside of academia. These assessment alternatives should not revert to their traditional counterparts once the world recovers from the impact of COVID-19. Instead, they should provide the way forward for rethinking the role of assessment in enhancing graduate employability in the post-pandemic world.

References

- Akimov, A., & Malin, M. (2020). When old becomes new: A case study of oral examination as an online assessment tool. *Assessment & Evaluation in Higher Education*, 1–17. <https://doi.org/10.1080/02602938.2020.1730301>
- Alexander, S., Cutrupi, J., & Smout, B. (2019). Taking a whole of university approach to employability. In J. Higgs, W. Letts & G Crisp (Eds.), *Education for employability* (Volume 2): *Learning for future possibilities* (pp. 117–132). Brill. https://doi.org/10.1163/9789004418707_010
- Allan, S. (2020). Migration and transformation: A sociomaterial analysis of practitioners' experiences with online exams. *Research in Learning Technology*, 28. <https://doi.org/10.25304/rlt.v28.2279>
- Bates, G. W., Rixon, A., Carbone, A., & Pilgrim, C. (2019). Beyond employability skills: Developing professional purpose. *Journal of Teaching and Learning for Graduate Employability*, 10(1), 7–26.
- Bell, D. N. F., & Blanchflower, D. G. (2020). US and UK labour markets before and during the COVID-19 crash. *National Institute Economic Review* 252. https://www.dartmouth.edu/~blnchflr/papers/BandB_CovidCrash.pdf
- Boud, D. (2020). Challenges in reforming higher education assessment: A perspective from afar. *RELIEVE-Electronic Journal of Educational Research, Assessment and Evaluation*, 26(1), 1–15. <https://doi.org/10.7203/relieve.26.1.17088>
- Boud, D., Ajjawi, R., Dawson, P., & Tai, J. (Eds.). (2018). *Developing evaluative judgement in higher education: Assessment for knowing and producing quality work*. Routledge.
- Bravery, K., & Tomar, A. (2020). How companies and employees can make their best coronavirus comeback. *World Economic Forum*. <https://www.weforum.org/agenda/2020/04/coronavirus-covid-business-resilience-preparedness-skills/>
- Bridgstock R. (2017). The university and the knowledge network: A new educational model for twenty-first century learning and employability. In L. Holmes & M. Tomlinson (Eds.), *Graduate employability in context: Theory, research and debate* (pp. 339–358). Palgrave Macmillan.
- Bridgstock, R. (2019). Graduate employability 2.0: Learning for life and work in a socially networked world. In J. Higgs, G. Crisp & W. Letts (Eds.), *Education for employability* (Volume 1): *The employability agenda* (pp. 97–106). Brill.
- Care, E., & Kim, H. (2018). Assessment of twenty-first century skills: The issue of authenticity. In E. Care, P. Griffin & M. Wilson (Eds.), *Assessment and teaching of 21st century skills: Research and application* (pp. 21–39). Springer, Cham.
- Coibion, O., Gorodnichenko, Y., & Weber, M. (2020). Labor markets during the Covid-19 crisis: A preliminary view. *National Bureau of Economic Research*. <https://www.econstor.eu/handle/10419/216634>
- Clark, T. M., Callam, C. S., Paul, N. M., Stoltzfus, M. W., & Turner, D. Testing in the time of COVID-19: A sudden transition to unproctored online exams. *Journal of Chemical Education*, 97, 3413–3417. <https://dx.doi.org/10.1021/acs.jchemed.0c00546>
- Cramp, J., Medlin, J. F., Lake, P., & Sharp, C. (2019). Lessons learned from implementing remotely invigilated online exams. *Journal of University Teaching & Learning Practice*, 16(1), 10.
- Crawford, J., Butler-Henderson, K., Rudolph, J., Malkawi, B., Glowatz, M., Burton, R., Magni, P. A., & Lam, S. COVID-19: 20 countries' higher education

- intra-period digital pedagogy responses. *Journal of Applied Learning & Teaching*, 3(1), 9–28. <https://doi.org/10.37074/jalt.2020.3.1.7>
- Efu, S. I. (2019). Exams as learning tools: A comparison of traditional and collaborative assessment in higher education. *College Teaching*, 67(1), 73–83. <https://doi.org/10.1080/87567555.2018.1531282>
- Fields, Z. (2019). Cognitive skills development at higher educational level in the fourth industrial revolution: A case for creativity. In Z. Fields, J. Bucher & A. Weller, (Eds.), *Imagination, creativity, and responsible management in the fourth industrial revolution* (pp. 126–157). IGI Global. <https://doi.org/10.4018/978-1-5225-9188-7.ch005>
- Fraser, C. J., Duignan, G., Stewart, D., & Rodrigues, A. (2019). Overt and covert: Strategies for building employability skills of vocational education graduates. *Journal of Teaching and Learning for Graduate Employability*, 10(1), 157–172.
- Fuller, R., Joynes, V., Cooper, J., Boursicot, K., & Roberts, T. Could COVID-19 be our ‘there is no alternative’ (TINA) opportunity to enhance assessment? *Medical Teacher*, 42(7), 781–786. <https://doi.org/10.1080/0142159X.2020.1779206>
- Grajek, S. (2020). Educause COVID-19 QuickPoll results: Grading and proctoring. *Educause*. <https://er.educause.edu/blogs/2020/4/educause-covid-19-quickpoll-results-grading-and-proctoring>
- Grajek, S., & Brooks, C. (2020). A grand strategy for grand challenges: A new approach through digital transformation. *Educause*. https://er.educause.edu/-/media/files/articles/2020/8/er20_3101.pdf
- Greiff, S., Wüstenberg, S., & Funke, J. (2012). Dynamic problem solving: A new assessment perspective. *Applied Psychological Measurement*, 36(3), 189–213. <https://doi.org/10.1177/0146621612439620>
- Hart Research Associates. (2015). Falling short? College learning and career success. *Association of American Colleges and Universities*. <https://www.aacu.org/sites/default/files/files/LEAP/2015employerstudentsurvey.pdf>
- Marr, B. (2020). 8 job skills to succeed in a post-coronavirus world. *Forbes*. <https://www.forbes.com/sites/bernardmarr/2020/04/17/8-job-skills-to-succeed-in-a-post-coronavirus-world/#456cf64c2096>
- McKie, A. (2019). Does university assessment still pass muster? *Times Higher Education*. <https://www.timeshighereducation.com/features/does-university-assessment-still-pass-muster>
- Moore, C., & Chandra, A. (2019, June). *Dynamic assessment to prepare agile graduates to succeed in unpredictable future careers* [Conference session]. HEQN 2019 Assessment Conference, Melbourne, Australia. https://www.hes.edu.au/sites/default/files/uploaded-content/field_f_content_file/catherine_moore_heqn_2019.pdf
- OECD (2014). *PISA 2012 results: Creative problem solving: Students’ skills in tackling real-life Problems*. <https://www.oecd.org/pisa/keyfindings/pisa-2012-results-volume-V.pdf>
- Osmani, M., Weerakkody, V., Hindi, N., & Eldabi, T. (2019). Graduates employability skills: A review of literature against market demand. *Journal of Education for Business*, 94(7), 423–432. <https://doi.org/10.1080/08832323.2018.1545629>
- Russell, D. (2019). Challenging students in a collaborative maths competition. *Teacher Magazine*. <https://www.teachermagazine.com.au/articles/challenging-students-in-a-collaborative-maths-competition?>
- Sankey, M. (2020). COVID-19 exam software survey. *ACODE Whitepaper*. https://www.acode.edu.au/pluginfile.php/8244/mod_resource/content/2/eExamsWhitepaper.pdf

- Scherer, R. (2015). Is it time for a new measurement approach? A closer look at the assessment of cognitive adaptability in complex problem solving. *Frontiers in Psychology*, 6, 1664. <https://doi.org/10.3389/fpsyg.2015.01664>
- Seow, P. S., Pan, G., & Koh, G. (2019). Examining an experiential learning approach to prepare students for the volatile, uncertain, complex and ambiguous (VUCA) work environment. *The International Journal of Management Education*, 17(1), 62–76.
- Sessanga, J. B., & Musisi, B. (2019). The role of teacher education in developing employability skills in higher education. In Keengwe, J., & Byamukama, R. (Eds.), *Handbook of research on promoting higher-order skills and global competencies in life and work* (pp. 85–98). IGI Global. <http://doi:10.4018/978-1-5225-6331-0.ch006>
- Slade, C., Rowland, S., & McGrath, D. (2019). Talking about contract cheating: Facilitating a forum for collaborative development of assessment practices to combat student dishonesty. *International Journal for Academic Development*, 24(1), 21–34.
- Tan, C. (2020). Beyond high-stakes exam: A neo-Confucian educational programme and its contemporary implications. *Educational Philosophy and Theory*, 52(2), 137–148. <https://doi.org/10.1080/00131857.2019.1605901>
- Teodorczuk, A., Fraser, J., & Rogers, G. D. (2018). Open book exams: A potential solution to the ‘full curriculum’? *Medical teacher*, 40(5), 529–530. <https://doi.org/10.1080/0142159X.2017.1412412>
- Tuffley, D. (2017). Can intelligent machines in the workforce lead to a net gain in the number of jobs? *Ecodev*, 31(1), 10–15.
- Watermeyer, R., Crick, T., Knight, C., & Goodall, J. (2020). COVID-19 and digital disruption in UK universities: Afflictions and affordances of emergency online migration. *Higher Education*. <https://doi.org/10.1007/s10734-020-00561-y>
- World Economic Forum. (2016). Future of jobs report. <https://reports.weforum.org/future-of-jobs-2016>

Bios

Andrew Kelly, PhD is the Manager, Learning Support, at Edith Cowan University. Dr Kelly’s research interests include academic integrity, academic development, and online learning. Email: andrew.kelly@ecu.edu.au

Catherine Moore, PhD is the Division Secretary for the National Tertiary Education Union in Western Australia. Previously Dr Moore was a Senior Academic Developer at Edith Cowan University, specializing in assessment and moderation. Email: cmoore@nteu.org.au

Emma Lyons is a Senior Learning Designer at Edith Cowan University. She previously worked in learning adviser roles, specializing in English language teaching and development. Email: e.lyons@ecu.edu.au

How to cite this chapter:

Kelly, A., Moore, C., & Lyons, E. (2022). Traditional exams, 21st-century employability skills and COVID-19: Disruptive opportunities for rethinking assessment design in higher education. In R. Ammigan, R. Y. Chan, & K. Bista, (eds), *COVID-19 and higher education in the global context: Exploring contemporary issues and challenges* (pp. 67-79). STAR Scholars. <https://starscholars.org/product/covid-19-and-higed/>