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Contents

This special technology enhanced learning issue of *Compass* contains a fascinating range of articles: critical appraisal of published reports on new technologies; skilling the visual effects artists of the future UK film industry; a student perspective of flipped learning; a series of insights into and reviews of various technological tools with application to higher education; self-assessment to counter student dissatisfaction with assessment feedback; technology-related continuing professional development; a call for equal emphasis on verbal skills' development in a digital age; aspects of course and activity design. It presents a multi-faceted and inter-related picture of contemporary higher education that is rich indeed!

The Horizon Reports – published by the New Media Consortium (NMC) – come under appraisal in a paper by Sonja Grussendorf which seeks to redress a perceived lack of critical engagement with them in the academic literature. Sonja is concerned that these reports, popular among the educational technology community and influential for their predictions of technologies likely to be of value to the higher education sector, should be scrutinised properly; after all, they influence purchasing decisions and thus, inevitably, pedagogy as well. The paper, in some detail and with creditable objectivity, explores the degree of influence wielded by the reports and assesses their predictive accuracy and consequent impact; it also seeks to discover whether they subscribe to any ideology and, if so, whether this is made explicit by the NMC.

'VFX HE Online Mentoring Programme 2017', a project led by the University of Greenwich, set out to provide students with an in-depth understanding of visual-effects (VFX) productions and of the hard and soft skills required for making them; to do so, it harnessed the expertise of three professional facilities. The British Film Institute has identified widespread VFX skills' shortages in the UK and the industry is having to source talent from abroad. The higher education sector thus needs to respond, by equipping UK students with appropriate training. Jin Zhi's case study outlines the two-part, technology-enhanced mentoring and learning programme in Greenwich's Department of Creative Professions and Digital Arts: provision to the students of exclusive learning videos made by the three VFX companies; end-of-week online question-and-answer sessions for the students to interact directly with the companies' senior creative artists. The study also provides key findings and offers recommendations for the future versions of the programme.

Gemma Boden and Fon Yan Li offer a balanced and well-referenced analysis of the application of flipped learning and is a positive and helpful addition to the literature on this topic. The authors draw on personal experience of well-managed flipped learning to argue that this approach has much to offer. Their view is that it overcomes – by means of such directed prior learning as recommended reading and the watching of relevant videos – disparities in student understanding. It thus improves classroom engagement with, and engenders enthusiasm for, a range of stimulating activities; the learning becomes student-centred and the flexible classroom a safe space for interaction, discussion and debate. The paper makes clear that it is incumbent on the teacher to be proficient in the method and sensitive to individual learning styles, and on the student to put in the effort to complete the preparatory learning.

Identified problems with the traditional assessment model of a University of Greenwich land law course, together with changes proposed for professional legal education, led to alternative assessment methods using learning technology. Sandra Clarke offers a review of this process and considers, in a very balanced appraisal, the advantages and challenges of

using the Moodle Workshop tool for a new formative, peer-reviewed and peer-marked exercise and the Moodle Quiz tool for the online replacement of a seen written exam. Some very helpful guidance is offered for the design of multiple-choice questions in the latter case. Sandra also makes very clear the need, especially for assessing the full range of skills demanded of lawyers, for an appropriate selection of modes of assessment across the course.

A comparative case study explores the respective contexts, institutional drivers and evolution of the use of the Carpe Diem Learning Design methodology by Glasgow Caledonian University (to support the development of online programmes) and the University of Northampton (to develop blended programmes). Julie Usher, Sheila MacNeill, and Linda Creanor provide a meticulously-detailed account of these institutions' applications of Carpe Diem, concluding that it is well-suited to purpose, as long as some customisation and contextualisation is incorporated to meet institutional priorities. Though the two examples are not alike, common benefits and challenges emerged; the paper's appraisal of these certainly fulfils the authors' desired aim of contributing to the collaborative narrative about what is involved in implementing and embedding a formal learning-design process.

A technology review, containing the careful analysis of six (free or free-with-paid-add-ons) web-based 'student response systems', intends to help others to choose from the many such tools on the market; Martin Compton and Jason Allen consider these six the best available, on the basis of functionality and ease of use, and highlight their unique selling points. (The paper endorses the deliberate incorporation of student-owned mobile devices into teaching and learning sessions to harness the associated benefits of such hardware and to minimise possible in-class misuse.) Following their informative analyses, Martin and Jason confirm that all six can improve student engagement and interaction and suggest that teachers should be encouraged to try out at least one of them, with appropriate training and support and with due consideration of data protection guidelines. They add that teachers 'should always know what they expect of students and apprise them of those expectations and of what they will be sharing.'

Kahoot!, a game-based student response system, is examined by the authors of a review of this software. Gemma Boden and Lindsay Hart say that its bright colours, graphics and music make it an ideal medium for enthusing students in the classroom. Accessible via personal mobile devices, it can be deployed by the teacher – using a computer and the class screen – at the beginning of a session, to assess prior learning or, at the end, to review key points or test what the students have learnt in class. Essentially, it presents topic-related quiz questions and participants select from multiple-choice answers on their devices. The paper's provision of a SWOT analysis of its strengths, weaknesses, opportunities and threats does lend some balance to this review, but Gemma and Lindsay confirm that their own observations of it in class and students' informal feedback both support an overall favourable judgement of its merits. Not only is it straightforward for staff to use, but it also, from visible (and aural!) evidence, stimulates engagement and improves concentration. Perhaps, best of all, it is free.

Formative assessment in Mathematics by means of Moodle's quiz option is examined in relation to the development of students' understanding by means of a series of non-assessed online quizzes. Steve Lakin, whose paper considers the application of this technology, discusses the opportunity of creating various versions of the same question; the

multiple-choice options can be specified, to include one correct answer and other variants, covering common mistakes that students make. Feedback indicated that students found the approach very useful for exam preparation, though Steve clearly identifies the application's limitations: Moodle doesn't have many important mathematical functions built into it, so that questions do have to be manipulated to allow for any randomisation; it doesn't allow for any graphical randomisation. The conclusion: 'useful, but limited.' Steve, however, does see its possible application to other subjects with a core mathematical or statistical element.

John Casey's paper focuses on web annotation, its tools and standards to consider their 'potential to support learning and teaching across a range of activities using existing web resources', for 'annotations can be published, shared, managed and curated, as well as re-published via social media channels.' Web annotations are overlaid on the original web page, are separate from it and are under the *annotator*'s control; to a third-party viewer, however, they co-exist with the original content. There are thus implications for copyright, authorial reputation and ownership. John explains that there is opportunity in web annotation for interaction both with content ***and*** other web users – marginal notes can 'become media-rich and shared with others'. In 'face-to-face', online and blended classrooms', annotation (whether of text, image or audio-visual resources) combines traditional and digital literacies.

Against a carefully-considered theoretical background, David Thompson presents the study of an attempt to counter evidence of student dissatisfaction with assessment and feedback practice, in this case in undergraduate film production courses, and to deal with 'the characteristic indifference and laissez-faire attitude of students engaged in film-making.' The activity, undertaken immediately prior to the students' 'live' summative feedback from the teacher, involved the students' written appraisal of their own work against the original brief for the task and their identification of aspects needing development. This was followed by a digitally-recorded focus group, allowing the students to reflect upon their self-assessment experience. Such qualitative data provided David with two key findings: to appraise without knowing what action to take constitutes a barrier to student engagement with their feedback; 'being able to maintain a distance from and perspective of their work' helps students to assume personal responsibility for what they do.

Huge investment in technology in the higher education sector has not necessarily produced the transformative effect on teaching, learning and assessment that might have been expected. Continuous professional development (CPD) must not be a 'one-size-fits-all' approach, according to Timos Almpanis and Martin Compton, the authors of a very cogent rationale for CPD emphasise, not upon the technological functions of tools and virtual learning environments (VLEs), but upon individualised and needs-focused applications that really do transform pedagogy. With their background in and experience of offering formal technology training for academics, Timos and Martin are convinced that user-friendly, 'quick win', cloud-based apps are the way forward – they have been 'using, testing, collecting and disseminating these tools for several years.' Furthermore, they advocate a shift away from the culture of having CPD 'done' to staff and for staff themselves to have ownership of the materials used. In a nutshell, the message here is that such institutional platforms as VLEs may still serve as a foundation, but fitter-for-purpose cloud tools may well encourage staff to be much more committed to and convinced by technology-enhanced learning strategies overall.

Online courses come under the scrutiny of Scott Malcolm Goudie, the author of an opinion piece which weighs up the advantages of acquiring quick and easy evidence of continuing professional development (CPD) against the concomitant failure of the courses themselves to stimulate real learning. Easy-to-guess or simple-to-deduce answers to multiple-choice questions that render unnecessary any pre-assessment study of online learning materials may achieve a comfortable CPD box-tick, but can hardly be said to confirm the competence and credibility of individuals or their professions. Personal experience and careful reference to the associated literature lead Scott to conclude that online CPD courses must be meaningful: 'failure assessments' – prior to release of learning materials – to highlight gaps in knowledge and understanding; problem-based learning that requires study of the materials to achieve answers and solutions; improved design of these courses to make them pedagogically sound; accreditation of the courses according to proven impact on professional development; massive open online courses (MOOCs) to facilitate real-time group CPD sessions. The article ends with the hope that new technologies will help with course design and encourage more constructive responses from learners.

In our digitally-connected age, says Nicky Garsten, the author of lively argument which emphasises the importance of face-to-face communication, we should not neglect students' verbal skills. Though tech-savvy students may prefer to communicate by messaging or email and though they must certainly have excellent digital capabilities to be employable, this opinion piece points out that employers really do want graduates to be able to talk well. Nicky outlines some key ways of countering students' reticence: just being aware that speaking in seminars may be stressful for some students; arranging seating to enhance a group's visual and verbal interactions; consistently and explicitly demonstrating in seminars that students' views, uncertainties and personal knowledge are all valued; making student/staff one-to-one consultations welcoming and supportive. The piece ends with one clear message: staff should be mindful of the importance of developing in students ***all*** forms of communication – digital, written and verbal.

A case study offers an overview of the experience of 'designing a serious game for a large inter-disciplinary course at the London School of Economics and Political Science.' The intention was that the game should enhance student engagement on a course with a mixed-ability cohort. The authors of this paper, Sarah Jane Leach, Geraldine Foley, Jose Javier Olivas Osuna, and Aggie Molnar, set the scene and offer the pedagogical rationale, before outlining the game itself, the design process and the challenges. The meticulous evaluation process included observation of a significant proportion of the game-playing sessions (there was considerable variation and tutor interpretation of the rules!) and the acquisition of qualitative data from both students and staff. Overall, there are some fascinating insights here into the benefits and challenges of deploying game-based learning, especially on such a large scale. The authors conclude that more time for training the staff to practise the running of the game and the managing of the post-game activity would enhance what was a generally well-received exercise.

The STEEPLE (seven environments in which organisations must function – Socio-cultural, Technological, Economic, Ecological, Political, Legal and Ethical) model is usually deployed in business organisations' strategic decision-making, but an article in this issue of *Compass* describes its helpful application to course design for the PGCert HE in a University of Greenwich partner institution in Trinidad and Tobago. Peter Colin Kelly explains how each of

the STEEPLE environments relates to the process of curricular design; though not a course-design model itself, STEEPLE can be very useful in supporting those models which are, in order to make courses and modules flexible and responsive to the demands and expectations of society and the working world in which students will be employed.

I hope you enjoy reading through the articles, opinion pieces and case studies in this special edition as much as we have enjoyed putting this issue together.

Danielle Tran
Editor

It's good to talk in the Digital Age

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Abstract

Our millennial students may, at times, feel apprehensive about talking face to face or on the phone. Whilst the development of digital skills is crucial in our connected age, let's not forget about the importance of verbal communications.

The media can portray youngsters as digitally obsessed, detached and inarticulate. For instance, in the BBC comedy '*W1A'* the intern, Will Humphries (played by Hugh Skinner), *"spends most of his time wandering round plugged into his MP3 player trying to find out what he's supposed to be doing"* (BBC, 2017). He rarely initiates a conversation. When he responds it is usually with the monosyllable 'cool'. This portrayal certainly isn't my experience of our lively student population, many of whom secure fabulous work experience opportunities for themselves. However, the characterisation does make a point.

Talking isn't always students' first choice of communication with co-workers on an internship. Verbal reticence was identified at a recent conference bringing together employers and academics at Birmingham City University.[1] Head-phoned student interns, reported a disappointed practitioner, were more comfortable communicating silently on screen than speaking face to face to colleagues or clients. What students needed, she said, was to be taught verbal communication skills. Similarly, lecturer Sam Pidoux noted that students often preferred to email lecturers rather than to speak to them during office hours. Emails were not only convenient but also relieved undergraduates of their anxiety about broaching potentially awkward conversations face to face. Pidoux believes that students need to understand that a normal part of conversing is feeling stress when broaching awkward topics.

"Millennials are digital omnivores'' according to millennial marketing specialist Josie Baik (2016). Their online savviness is a strength in an age where digital developments have the potential to unlock $100 trillion (World Economic Forum, 2017). Indeed, digital transformation, according to the World Economic Forum (*ibid*., p. 2), *"has the immense potential to change consumer lives, create value for business and unlock broader societal benefits."* According to PwC research, two thirds of UK chief executives surveyed report problems in recruiting people with digital skills (Ellis, 2017). Never has the need to teach our students digital skills been more acute.

Yet, as outlined earlier, there is also still a need for the soft skill of verbal communication. The ability to communicate verbally, inside and outside an organisation, is in the top three skills employers most want in graduates, according to Forbes (Adams, 2014). Nevertheless, our students of this generation 'hate' talking on the phone because they are 'more

[1] Mind the PR Gap 2017- bringing together research and practice. 12th July. Birmingham City University.

comfortable' with texts, emails and messaging, all of which give them the opportunity to pick their words (Alton, 2017).

When we encourage our students to speak, there is no doubt that we need to adapt to our 'digital natives' (Prensky, 2001), even if in small ways. It's a start just being aware that for some students, in some situations, talking may be stressful. We can bear this in mind when we expect students to participate in academic life, be it verbally contributing to seminar sessions or taking advantage to talk to their tutors in office hours. Since seminars are integral to university teaching in many institutions and countries, do we organise seating so that students can look at each other when speaking? Do we show interest and curiosity when students tell us things that we don't know? Do we have a rule that no question is 'stupid', given that, if one person in a group articulates something, it is likely that others are thinking it too? Lecturers often offer office hours. I was startled when a friend's daughter observed that she had initially felt, in her first year, that her lecturers didn't really want to see her during their office hours. How do we greet students when they knock at our doors? Counsellors refer to the importance of eye contact at entry, to help facilitate relationship depth. Furthermore, we can convene special drop-in surgeries – for specific assessments – that convey the message that it's okay to have further questions about assignments and it's important to start work early on these tests.

We can also support networking events for our students by inviting alumni and other professionals, who can help them develop their professional networks. In preparation for these events, we can coach them. Introverts for instance, can learn from the excellent guidance of Cain (2012) and Zach (2014). The key point for them to learn is that both introverts and extroverts can be great networkers.

Students are expected now to enter the workforce with digital, writing and verbal skills. This means that we need to be mindful of teaching *all* these skills. I've never met a student like the character, Will Humphries. We need to talk to our students to ensure that we never do.

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Flipped classroom: a student experience

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Supported by Bergman and Sams (2014), the Flipped Learning Network (2014) defines 'flipped learning' as a pedagogical method "in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter."

It is an approach that changes the conventional constructs of a classroom. Successful implementation relies on three components: collaboration, student-centred learning and optimised learning spaces (Bergman and Sams, 2014). In a traditional setting, the student would be presented with learning material for the first time, whereas in a flipped scenario, the student is required to engage in preliminary learning. This familiarises them with the content before the lecture, creating a session that encourages questions and debate, rather than one where learning depends solely on the educator's delivery. Often, thanks to such prior preparation, students will have studied such a wide spectrum of different aspects of the subject from a range of sources, that the learning during the lecture – of both individual students and of the class as a whole – is enriched (Kumah, 2015). The resources used in the deployment of flipped learning vary in accordance with the topic taught. Video may be recommended (its application commonly associated with the practice of flipped learning), but it is not pivotal; it should instead act as a gateway to further and deeper learning and the practitioner should remain focused on the reclamation – for the most effective use – of the time spent in class (Bergman and Sams, *op.cit.*).

My first experiences of flipped learning, a new concept to me despite my previous higher education (HE) studies, were positive. The cohort was large, comprising more than fifty student paramedics aged from eighteen to forty and representative of a diverse scope of knowledge and experience: some with backgrounds in healthcare, some having changed career from a different industry altogether and some fresh out of college. The requirement for pre-learning ensured that the students entered the classroom with similar levels of topic understanding and it helped to eliminate that sense of trepidation and vulnerability which a more traditional teaching environment can induce in participants. We were asked to do such prior learning as specific recommended reading and the viewing of topic-related videos. The increased level of enthusiasm and student engagement was noticeable. Incorporated technology and media became fundamental aids for students whose learning styles did not favour the didactic approach. For instance, Prezi was a novel alternative to the standard slide show and *Kahoot!* quizzes necessitated active participation – to take part in these, students found themselves encouraged to use their mobile devices, something they might well have found at odds with the usual imposition of restrictions in class. With points awarded for correct answers and speed, and with a much-coveted 'Curly Wurly' reward for the top three players on the leaderboard, it is not hard to understand that students completed pre-learning tasks without demur. As you can imagine, in a class consisting of fifty-seven students on a full-time course, it wasn't long before competitive instincts kicked in,

producing such a commotion that the lecturer from next door peeked in to see what was going on!

Chocolate incentives aside, the quiz was a useful tool to recap subjects covered. It gave the tutor a quick and concise method of pinpointing areas of learning that needed further work. Flipped learning also offered the opportunity for teacher-student relationship development. Time that might previously have been devoted to teaching had now been dedicated to such practical applications as practising cannulation and basic life support with mannequins and participating in role plays based on both factual and fictional case studies.These sessions did not adhere to a rigid structure creating a safe space where questions, thoughts, open discussions and debates were always welcome. Theory can be learnt, but putting it into practice can be an entirely different matter. Being acutely aware (and wary!) of the fact that the role of a paramedic is hands-on, I relished any additional time to practise and refine my techniques. On the rare occasion when I was unable to complete the pre-learning, it became apparent that it was easy to fall behind. Not only would the Curly Wurly be unattainable, but it made practical lessons difficult. Ironically, by not doing the pre-learning, I found that the workload seemed to increase twofold.

In the current digital era, when the use of the internet has become habitual and information is freely accessible, flipped learning is increasingly relevant. Whilst HE was previously heavily textbook-based, flipped learning is multi-faceted. It takes advantage of a wealth of material and comprises various elements, including online academic help-seeking and self-directed study. The flipped classroom is a contemporary take on learning well-suited to a generation that has grown up alongside Google. The notion of relying exclusively on textbooks as a means of learning is no longer realistic.

Research has shown that students who participate in a flipped environment value interaction, flexibility and accessibility (Avdic and Åkerblom, 2015): presenting students with the opportunity to learn at their own pace seemed to resonate positively - a view echoed by my peers in a collation of optional feedback. Furthermore, the variety of teaching aids connected with visual, auditory and kinaesthetic learning styles (*op.cit.*) resulted in reports of greater student involvement, autonomous learning, motivation and achievement (Chyr *et al*., 2017; Zainuddin and Halili, 2016). A shift of emphasis from teacher to learner created a student-centred approach. I certainly felt that this shift in method was positive and empowering. When there is an expectation that information will be willingly given, learners can become disengaged and indifferent. My personal drive came from the fact that if I did not complete the pre-learning, I knew I would be at a disadvantage in class. Furthermore, as I undertook the groundwork for the forthcoming session, I found that my enthusiasm grew in tandem with the interest my studies provoked.

The success of the flipped classroom relies on several factors: students' willingness to put in effort and become self-sufficient; their completion of preliminary learning tasks, on which depend growth of confidence, increase in participation and the greatest personal learning gains (those who don't complete have to play catch-up and inevitably struggle in the forthcoming lesson and subsequently); determination by the teacher to maximise the benefits of positive teacher/learner interaction to ensure a growth mindset; the teacher's creation of a safe learning space (Sickle, 2016) to allay or prevent completely those feelings of vulnerability which lead students to avoid answering questions in class for fear of being wrong; the absolute imperative that the teacher is appropriately trained in the flipped-

classroom method – someone untrained may not account for individual learning styles, with consequent adverse effect on students' engagement, motivation and interaction (Zainuddin and Halili, 2016).

When undertaken properly, flipped learning can be a rewarding and modern alternative to the traditional classroom, as the teacher and student must coexist and work together to create a united approach (Yamashita and Yasueda, 2017). Although my experience of flipped learning was enjoyable, I agree that there are limitations, as stated in the cited literature. It may not be a way of learning with appeal to mature students, who may be used to and more comfortable with conventional techniques. Furthermore, the concept may not prove popular with introverted individuals. Despite the presence of a trained lecturer who encourages all learners to participate equally, some students will always be reticent when it comes to speaking in front of a class, whilst others, more extrovert, will naturally spend more time participating and interacting with the lecturer. Educators should therefore be aware of and sensitive to the differing classroom experiences of diverse personalities and learning styles.

For teachers who are thinking of changing their classrooms into a flipped-learning environment, there are some important considerations: first, time spent in class should centre on activities that cannot be achieved at home – discussions, collaborations and group projects; second, teachers should practise what they preach – flipped learning should be adopted in all classes to ensure success; third, teachers should make use of existing material (such as the Khan Academy) rather than feeling that they must create their own. Since other sources will naturally be discovered as students partake in pre-learning activities, a platform for sharing amongst peers should be made available for use as desired (Ullman, 2013). As for students with no experience of the flipped classroom, the initial adjustment may be difficult at first, but it's essential to keep an open mind (Yildirim, 2017).

Overall, I found the flipped classroom interesting and engaging. The variety of approaches and use of appropriate technologies enabled me to become self-sufficient and to learn more effectively. Our having been able as a group to share that experience opened up opportunities to work together, discuss and question. Finally, though there is no doubt that there are positive outcomes associated with flipped learning, it is important that emphasis remains on the learners and their experience, with adjustments and improvements to the method where necessary (Sickle, 2016).

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"Online CPD courses: Do they enhance student knowledge?"

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Most professional bodies require registrants to demonstrate a commitment to continuing professional development (CPD). During the re-registration process, the registrant's CPD folder may be audited by her/his registering body to check that the registrant has evidenced the knowledge, skills and experience gained throughout that period of professional practice.

Anticipation of a CPD audit leads many professionals to search for quick, easy and often free CPD courses that can be evidenced in their portfolio. The internet has become saturated with free courses relating to all disciplines of CPD for professional practice. Many employers also use an online course method to ensure that employees meet statutory and mandatory training needs for each year.

In recent years, online CPD courses have become far more commonplace. It is easy to see why: materials are widely accessible to all and may be enhanced with seemingly endless technological possibilities – audio, visual, animation, conferencing, discussion forums, social networking – all of which help to give the student a richer learning experience (Harish, 2013). Strong consideration is given to financial cost. Once course materials have been developed, little remains to enable that course to run effectively. Administration, consumables, wages and expenses are just some of the costs reduced by transferring materials online (Herman and Banister, 2007).

Moving to online courses seems logical, given the time and monetary constraints placed on modern businesses. The ability to 'tick the box', as confirmation that employees have complied with yearly requirements, is a necessity and employees want quick courses that provide them with evidential CPD certificates. But are these online courses fit for purpose? What pedagogy is used to facilitate learning?

Recent personal experience would suggest that the raison d'être of some courses is merely to 'tick the box' rather than to educate students meaningfully. Having undertaken several online courses billed as 'essential' training, I was able to complete them without having to open any online learning materials – I was able to skip straight to the course assessment and take them immediately. The answers to most multi-choice questions were guessable and I could address the more difficult questions by a logical process of elimination. At no point was reference to learning material required in order to answer a question. Furthermore, if I failed any CPD test, the consequent provision of correct answers enabled me immediately to repeat them and attain perfect scores – in subjects I profess not to know much about!

I have complied with mandatory training and can evidence my CPD – but have I learnt anything? Superficially, this may seem a win/win situation. I have certificates and have met statutory requirements. What does this mean for the competence of individuals and whole professions? If unchecked, this type of emergent CPD runs the risk of misrepresenting the competence and thus undermining the credibility of the professions involved.

Zimmerman (2012) states that “learner-content interaction is an essential element of the learning process” and satisfaction should be derived from the fact that subject knowledge has increased. However, the design process of these CPD courses is lacking in this regard. Akyol and Garrison (2011) recommend that focus be placed on linking cognitive learning processes to the learning outcomes of materials, so as to gauge whether learning has occurred. This cannot occur in assessment in which answers can be guessed or logically deduced.

An important factor in the learning process is learner compliance. It is often difficult for a student to engage with mandatory training, as the subject matter is rarely of interest. If a student is to approach and engage with learning in a deep, meaningful manner, the material framework needs to promote inquiry, whereby the student will develop and enhance their knowledge by constructing their own personal learning experience, developing existing knowledge and obtaining new information (Akyol and Garrison, 2011). This approach must excite the student and maintain engagement throughout in order to work.

To encourage students to read subject material, it may be worth including a productive failure assessment prior to release of the course material. This involves the students answering questions which s/he may fail, highlighting specific knowledge gaps in areas that require exploration in greater depth and detail (Sharples *et al.*, 2016). This form of enquiry-based learning requires – and therefore encourages – students to delve into areas where their knowledge/understanding is weak before they can successfully undertake final assessment. Only once students have undertaken this should they be able to access the certificate. Failure in one particular area should require the student to revisit it in order to understand why s/he answered incorrectly: real learning is achieved not by the giving of the answer, but rather by the provision of a problem-based learning situation that will lead to discovery of the answer through engagement with the material.

In the quest to ensure that professionals are keeping up to date, paper certificates have replaced the genuine requirement for sound and meaningful acquisition of knowledge. Online CPD courses should be scrutinised for design and relevant pedagogical merits. It is time for professional bodies to look at what effect this could have on their registrants and devise methods of accrediting individual CPD courses according to the positive impact they can have on professional development.

For convenience, many time-constrained professionals seek sanctuary in online teaching materials, which by their very nature, are asynchronous. Both Pelz (2004) and Sharples (2016) recommend the use of online materials, as students are in their own environment and engage with the materials when they feel comfortable and ready. This allows them to analyse and digest the information and then undertake assessment when ready to do so; this engages everyone and removes the immediacy of traditional classroom teaching. Massive open online courses (MOOCs) could be used to facilitate real-time group CPD sessions, allowing professionals with united interests to collaborate and disseminate knowledge and research through discussion. Sharples (2016) recommends that web-designers, academics and educational technologists should collaborate to improve technological pedagogy.

Professionals should be encouraged to participate in ***meaningful*** CPD, in order to demonstrate a positive approach to reflective learning and so contribute to the development

of their profession. Newer emergent technologies will hopefully bring about change in attitudes and behaviours relating to course design and encourage a positive pedagogy. In a world where time and money are considered crucial elements of course design, it can only be hoped that behaviours dictated exclusively by time and money do not become pandemic and hinder the development of the very professions they inhabit and profess to enhance.

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Students on board: designing a board game for 1000+ students

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Keywords: Game-based learning, Higher Education, Board games, Strategy, Economics.

Introduction

This case study provides a brief overview of our experience of designing a serious game for a large inter-disciplinary course at The London School of Economics and Political Science (LSE). The game was developed with the aim of enhancing student engagement on a course with a mixed-ability cohort. We present the pedagogical rationale and the challenges of designing games for educational purposes and provide both the details of the learning objectives we aimed to fulfil through the game and the findings from the evaluation process.

Context of the project

The project, funded by an LSE Learning Technology and Innovation (LTI) grant, was initiated and supported by an LSE100 teacher, Dr José Javier Olivas Osuna, in collaboration with Sarah Leach, Geraldine Foley and Aggie Molnar from the LSE LTI team.

The grant was awarded in the summer of 2016. However, as the game was developed at the same time as the module, the specific learning objectives and course materials were being debated until September. Considerable time was spent on game designs - with varying learning objectives - that would later be abandoned. This left only four months to design and play-test the final tile-laying game, as well as to produce the instruction material and game components, ready to facilitate teacher training in January 2017. The game was played in 137 classes, over a period of three and a half days, in early March 2017.

'LSE100: the LSE Course' is a compulsory first-year course for all LSE undergraduates and comprises four modules. Classes on LSE100 require students to work outside their discipline with a limited amount of contact time. Since this course does not count towards students' degrees, there is some challenge in securing their engagement with course materials and their commitment to preparation for class. The game '*Capture the Market'* was designed to reinforce some of the key concepts from the module in an enjoyable, engaging and accessible way, by encouraging critical thinking via the game's interactions and requirements to make choices. (See Appendix 1 for a detailed list of objectives.)

Pedagogical rationale

Experiential learning via games has been found to have a positive impact on conceptual understanding, skill development and student motivation (Felicia, 2011). Games can provide a risk-free environment to practise skills, apply knowledge and get feedback (Kafai and Burke, 2015). Although it is important not to assume that games are intrinsically motivational (Whitton, 2010) they can often "make learning fun" (Kirriemuir and Mcfarlane, 2004:4) and motivate disengaged learners (Griffiths, 2002, and Squire, 2008, cited in Plass, Homer, Kinzer, 2015).

The game was designed in accordance with a constructivist approach to teaching, which views learning as an active, contextualised process of constructing knowledge rather than acquiring it (Vygotsky, 1987). It was created to be played at the end of a newly-developed module entitled: 'Should Markets be constrained or unleashed?' This module examines the economic principles of free markets and the case for government intervention and introduces the meta-framework of 'agency, structure and ideas' (Figure 1).

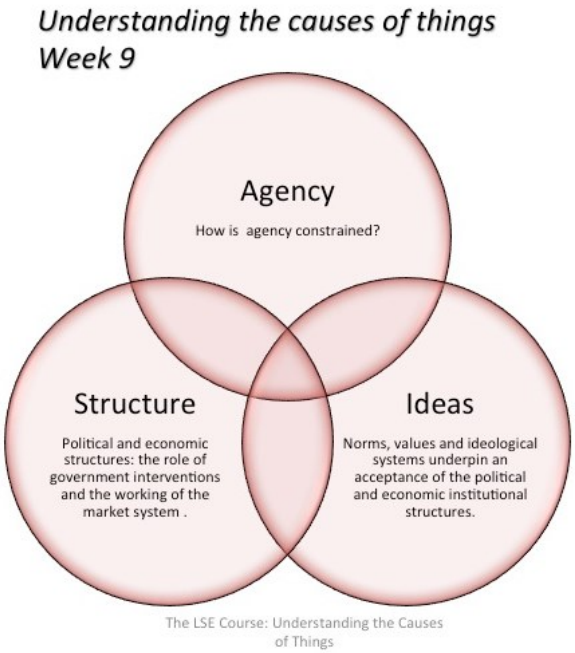

Figure 1: Meta-framework of 'Agency, Structure and Ideas'

The main learning objective was to develop an understanding of free market mechanisms and the features that enable or constrain the effective working of the market and our agency within it. The game provided opportunities to apply knowledge from the course lectures and readings and facilitate the abstractions needed for knowledge to be generalised to novel situations. In the post-game discussion, students were required to analyse the game mechanics and strategies to reinforce and improve their understanding of the 'agency, structure and ideas' framework.

The game

'Capture the Market' is a competitive tile-laying game for four to twelve players, incorporating techniques and mechanisms from modern board-game design to illustrate the dynamics and limitations of markets and economic liberalisation. (See Appendix 2 for the design features.) The look of the game was inspired by an open-source game called '*Datopolis',* created by the Open Data Institute. Teams build the 'board' by placing hexagonal tiles (Figure 2), which represent the market. The game is played in rounds and in each round the teacher presents new 'government interventions'.

Figure 2: *'Capture the Market'* Game

Players gain points according to such criteria as control of an industry and diversification of investments. Additionally, each team is given a 'secret objective' card (Figure 3) that provides another way of obtaining points during the game and helps to guide those who struggle to define their strategy in the game. For example, 'Your secret objective is to...promote protectionist laws'.

Figure 3: Secret Objective Card

Twelve hexagonal tiles are distributed randomly to each team and the placing of the tiles entirely depends on the players' 'secret objective' and the 'government interventions'. Counters (in four different colours) represent each team's 'ownership' of a tile and players/teams are allowed to invest only in counters adjacent to their other counters, unless otherwise specified by the 'government interventions'.

During the game, 'government interventions' allow players to flip tiles on the board. This represents a market changing from 'regulated' to 'deregulated' status or vice versa (Figure 4).

Figure 4: Regulated and Deregulated Tiles

Each game was designed to be explained and played in thirty-five minutes, leaving fifteen minutes for a post-game debrief and discussion.

Design process and challenges

In addition to the challenges involved in embedding the game into a new module, the most significant obstacles were: timing; finding a good balance between sophistication and accessibility; the large-scale nature of the course.

Timing was difficult because classes ran for just fifty minutes, meaning that the game, including time for instructions and point scoring, was limited to thirty-five minutes to allow for class discussion. The onus was very much on the teacher, not only to lead and draw out the learning objectives of the game, but to keep the game fast-paced. To support teachers, we created a video explaining the rules of the game and sent it to students ahead of classes, as well as playing it at the start of every class. Teachers were provided with detailed notes containing timings, instructions for the game and discussion guidance.

The task of creating an engaging thirty-five-minute game – aiming for a state of 'flow' (Csikszentmikalyi, 1990) or student's zone of proximal development (Vygotsky, 1978) – that was both easy to understand and play, yet complex enough to be enjoyable, was challenging. Playtests allowed us to gain feedback and make adjustments, such as highlighting the effects of 'economies of scale' and 'diminishing returns' in the scoring system.

The large cohort of LSE100 students, approximately 1500, were taught in small class groups (maximum twelve students) by a team of thirty-two teachers. Training the teachers, some of whom were sceptical about the benefits of game-based learning, proved to be a challenge. Though optional game-playing sessions were also set up to help teachers familiarise themselves with the game, only a few teachers attended them. The minimal time allocated to the final, mandatory training sessions meant that not all teachers going into class felt confident about the game. Teachers were also offered additional support to facilitate the game in class; a considerable number accepted.

To ensure that teachers were able to manage the game effectively, only one game was played in each class and students were split into four teams of two to four players. This gave flexibility for varying class numbers and helped with the mixed ability of the cohort, allowing students to use peer discussion and feedback to discuss their tactics.

Evaluation

Several forms of evaluation were carried out: the design team observed thirty out of 137 classes, with twenty different teachers; questionnaires were completed by 112 students (less than 10% of those who played the game) and fifteen staff (47% of teachers who taught the game); four students attended a focus group session; teachers provided their own observations and feedback after classes on the course's VLE discussion board.

Class Observations

We observed thirty of the 137 classes and saw a great variation in teaching delivery: different interpretations of the rules; teachers' encouraging 'thinking' time between rounds whilst others kept the game fast-paced; time spent reflecting on readings/links to concepts during the game versus pure game play; variations in game timing, which affected the length and quality of the post-game discussion.

An unexpected observation was the discovery that one teacher could not differentiate between two of the counter colours. Fortuitously, we were supporting this session and were able to offer alternative colours before play began. We had tried to foresee this issue by choosing colours that were considered accessible.

Student survey

The survey was distributed a week after the last game was played in March 2017. 112 students filled in the questionnaire, which comprised both closed and open-ended questions (see Appendix 3). Since the number of responses received was small, it was not possible to derive conclusive data from them. However, the survey reveals some commonalities worth mentioning.

The majority of the students (83% of the respondents) indicated that they enjoyed playing the game; they highly appreciated the element of 'fun' and the social aspect as well as the opportunity to interact and work in groups: *"It is helpful to look at the topic of markets from a different perspective. And though we are not children anymore, learning through playing still works".* Several positive comments referenced the *"chance to strategise"*, *"visualization of concepts"* and *"playing against my peers"*. Moreover, most students felt that the game stimulated decision-making.

More than half of the students agreed or somewhat agreed that the game connected with the module's framework of 'structure, agency and ideas' (Figure. 5), and that it helped them to think about the key concepts of the module (Figure. 6).

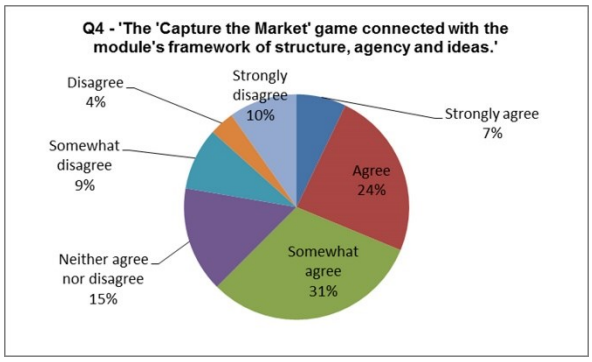

Figure 5: Student Survey Results (a)

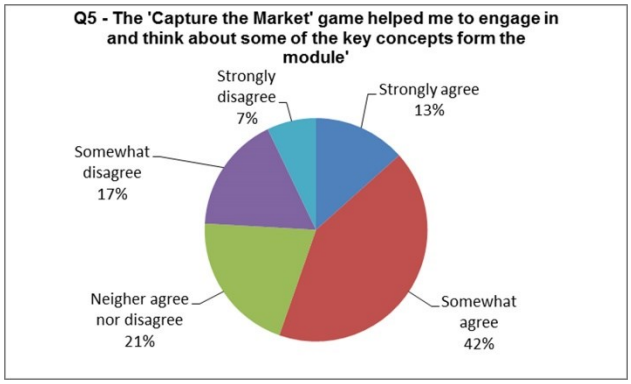

Figure 6: Student Survey Results (b)

The free-text comments showed a less positive assessment of the game's usefulness; they suggested that although the game helped students to think about the key concepts in the course, it did not necessarily help them understand those: *"While the game did involve the key concepts from the module, it merely identifies them, rather than providing insight or explanations into how they might actually affect the entrepreneur or the market in the real world".*

Furthermore, although the majority of students agreed that the game was an appropriate activity in the context of the module, follow-up comments revealed that some students deemed it "*appropriate but not necessary".* Other negative comments further questioned the usefulness of playing the game and its relevance to their studies. However, this could have

also reflected students' dissatisfaction with the compulsory course in general: "*[I] felt it was a waste of time when I could have been doing work/revising towards my actual degree".*

As for recommending the game to be played by next year's cohort, almost 90% of the students responded positively. Further improvements, such as making stronger connections between the game and the course material or using the game as an ice-breaker activity were also suggested.

Unfortunately, we experienced difficulties in getting students to attend focus groups to gain more qualitative data. The comments of the four students who did attend reflected the findings of the survey in that they enjoyed the game but did not necessarily think that it helped them gain a deeper understanding of the concepts from the module. They also reinforced our observations that students had very different experiences of playing the game according to their respective teacher's management of the class. A few of the participants questioned the appropriateness of using games for learning in their degree courses (rather than in an additional course); this might be an interesting topic to investigate further.

Teacher survey

The teacher surveys were distributed at the same time as the student ones. Out of the thirty-two teachers delivering the game, fifteen responded. (See Appendix 4 for staff survey questions).

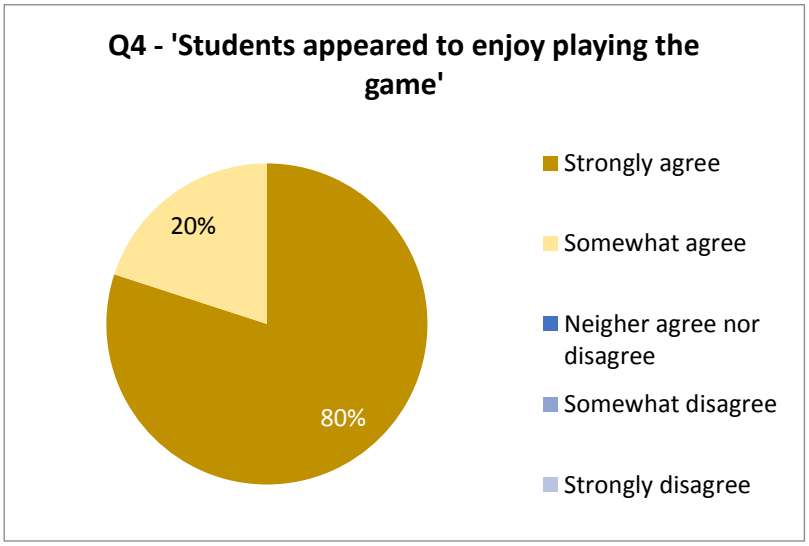

Figure 7: Teacher Survey Results (a)

In accordance with the findings of the student survey, most teachers strongly agreed that the students appeared to be enjoying the game (Figure 7). The following comment from a teacher conveys a description of the change in the students' level of engagement throughout the game:
"I did see some skeptical faces and a few groans when students first entered the room and saw the game materials being set up; however, by the end of the classes, students seemed quite pleased with how the class had unfolded and often left the room chatting among themselves about their strategies and scores."

The teachers found that students were particularly engaged when the game was played in pairs or teams (as opposed to individual players). Also, many reported that *"students easily adopted a competitive dynamic"* and that *"they were excited, involved and chatty*".

Despite the successful engagement with the game and the lesson, some teachers had doubts as to whether the game had increased the students' level of engagement with the module itself: the shortness of the learning experience and the limited depth of some discussions were mentioned as aspects which might have hindered students from linking the game to concepts. Nevertheless, one teacher thought: *"the game will provide an interesting and useful example/illustration/case for them to think about when considering the essay question and the module as a whole."*

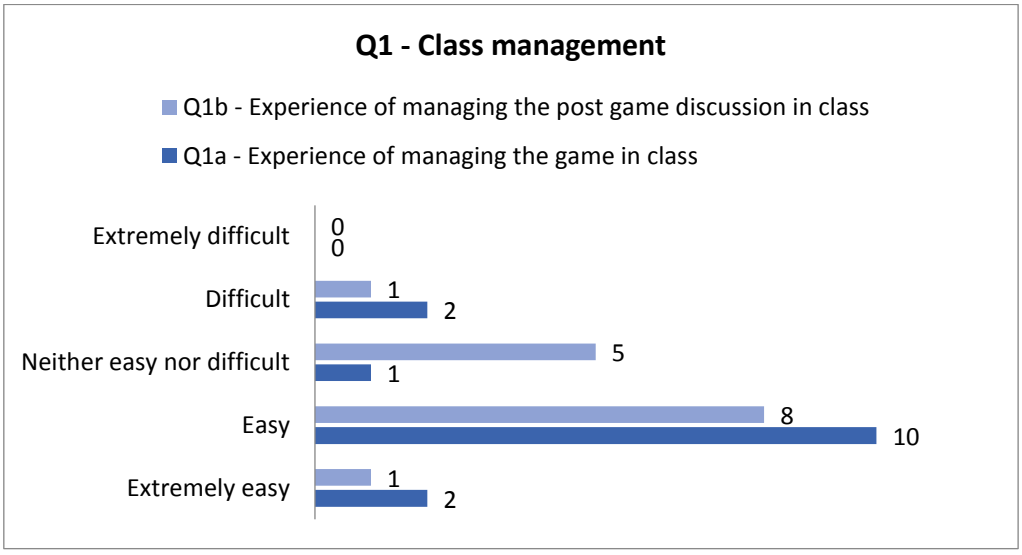

Figure 8: Teacher Survey Results (b)

Managing the class involved explaining and running the game as well as facilitating the class discussion. The majority (80%) of the teachers reported that they had found managing the game easy and straightforward (Figure 8) and said that having both the chance to play the game multiple times and the additional support offered by LTI did help to reduce anxiety: *"I wasn't sure if I would remember the nuances of the game, and knowing that we had to move fairly quickly, it helped that I had a facilitator". O*nly two teachers indicated that they had encountered difficulties: one referred to standing/walking whilst facilitating the game, whilst the other did not state a reason. As for managing the post-game discussion, the majority found it 'easy' and one third of the teachers responded: 'neither easy nor difficult' (Figure 8).

Although most teachers did not find the game or the discussions difficult to run, several teachers noted that they had found it challenging to create a smooth transition between the game and discussion. *"Students weren't able to quickly make the mental transition from 'game play mode' to 'academic discussion mode'"*. It was also pointed out that there were *"lively conversations about strategies and experiences"*, but *"silence"* regarding the readings. Many teachers felt that they could not rely on students having done the readings before class or having attended previous lectures or classes and this sometimes made the

discussion more difficult: *“Not everyone had done their readings but I was able to prompt the discussion referring to the lectures and overall this seemed to be the most engaging experience of the course for the students as well as for me”.*

Most teachers (80%) said that they would be happy to teach ‘*Capture the Market’* or other games in the following year. Free-text comments ranged from the widely enthusiastic to the less convinced of the benefits of game-based learning:

“I think the game was a brilliant success, and offered students the opportunity to do something different in the classroom environment while still considering key questions around the constraints imposed on the market by various forces. At the end of each class, I was feeling good about the result (despite wishing for an extra 10-15 minutes for discussion!) and students seemed happy, engaged, and motivated. For me, this is the mark of a highly successful class, and I would be thrilled to teach this game (or other equally well designed and considered games) next year!”

“They enjoyed it, but I'm not sure if they learned more from it than they would have from the average class strategies.”

The teachers' voluntary discussion forum posts were very positive, stating that it was a *"highly successful class"* and that the game was *"a great teaching tool".* One teacher noted that from a pedagogical perspective *"I had 5 hours of classes today and think they were some of the most engaging hours I have spent with my students so far. (…) My students were remarkably adept at drawing out from the game to the real world and concepts from the module. Admittedly engagement with the lectures and readings could have been greater from the majority of my students. (…) However my overall impression was that this was an immensely effective class."*

Discussion

The findings suggest that although the majority of the students enjoyed playing the game and felt engaged in the learning process, further improvements need to be made in order to emphasise the module’s concepts and help students to grasp a deeper understanding of them. A key challenge for using games effectively lies in providing close links between the game play and the learning objectives and outcomes (Facer *et al*., 2004, Egenfeldt-Nielsen 2011). In the case of ‘*Capture the Market’*, creating clear links between the game and the learning objectives was challenging, owing to: the large-scale nature of the project; the high number of stakeholders; the creation of the game alongside the course content. Although the aim was to have a strong connection between the game and the course readings, the readings were still being agreed very late into the module (and game) development process, which resulted in weaker links than originally planned.

Plass, Homer, Kinzer (2015:269) note: *“if the learning and game mechanics are not tightly linked, students may be intrinsically motivated to play the game but not necessarily to learn"*. Observations during the post-game discussions support this argument. A reason for this could be that teachers were often more concerned with getting the game played correctly and within the allocated time rather than focusing on drawing out the links between game play and the learning objectives. Also, as Sara de Freitas (2006) notes, it is important to provide the learner with the opportunity to consider, before and after game sessions, what

the learning objectives are, which facilitates opportunities for meta-cognition (reflection of the learner upon what s/he has learnt). This is confirmed by one teacher's observation that those students who had more time were more likely to draw links between the game and the learning outcomes:

"Some students struggled to identify the module concepts related to the game, but in the groups which finished play earlier and had more thinking time, they were all able to do this."

Creating a more structured and playful post-game activity may help in the future to ensure a more consistent student experience, bridge the gap between the game and the learning objectives and help students to achieve a deeper understanding.

Conclusion and recommendations

The goal of this project was to use an experiential learning activity (a game) to enhance student engagement on a large-scale inter-disciplinary course. The aim of designing '*Capture the Market'* was to produce an enjoyable and well-developed game that connected to the key concepts from the module and enabled students to understand these concepts more fully through post-game discussions.

We were pleased that, as the pilot project of a new game expected to be played simultaneously across multiple classes with a large cohort of students, '*Capture the Market*' worked logistically and that a large number of students and staff found the game enjoyable, engaging and connected to the course's learning outcomes.

When developing a game in a short time, it is important to ensure that all stakeholders are on board with the idea of game-based learning and that the learning outcomes are clear from the beginning. In our case, too much time spent on game design and play-testing meant that we had limited time to focus on teacher training and refining the design of the post-game discussion. We recommend expanding the training to allow time for teachers to practise running the game and managing the post-game activity, thereby creating a unified approach to delivery. This preparatory stage may help all stakeholders involved to understand better the benefits and limitations of game-based learning.

This was our first venture into serious games and we shall build on the lessons learnt to improve and support future game-based learning projects. As Berg Marklund (2015: 670) notes: *"Games just as any other educational tool, require a great deal of investment and hand on guidance from teachers, who need to continuously anchor gameplay in an educational framework".*

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Appendix 1

Aims of the project:

1. Increasing students' understanding of the mechanisms and incentives which operate in economic markets and the implications of liberalisation and regulation. Students' in-game choices are expected to be shaped by goals and incentives that are like those that drive capitalist market economies, such as profit maximisation, efficiency, reputation building and risk mitigation.
2. Critical thinking: Get students to question their own assumptions and pre-conceptions concerning market liberalisation and engage into the module with a more open mind.
3. Make concepts and readings more meaningful to students. The games can directly support some of the learning objectives of the course.
4. Contribute to students' development of transferable skills. Skills such as decision-making under time-pressure and evaluation of risk can be reinforced in this game.
5. Strengthening students' motivation and involvement with the course. Learning through games can be fun.
6. Create a game which presents a challenge for students, but which is not frustrating.

Appendix 2

Design features of '*Capture the Market'*

- Semi-cooperative (teams); this also helps with timing as it reduces the number of players to take a turn each round;
- Randomness (government interventions);
- Hidden roles and agendas (secret objective);
- Imperfect information;
- Scoring - multiple ways to win;
- Victory conditions – it is not clear who is winning until the end;
- Catch-up mechanism - some of the later rounds can allow people to catch up with double basic actions;
- 'Take that' element – take-over manoeuvre.

Appendix 3

Questions – Student survey

Q1 - Rate the following statement: 'I enjoyed playing the *Capture the Market* game in class.'
Q1.1 - Please elaborate further.
Q2 - How clear were the instructions on how to play the game?
Q2.1 - Please elaborate further.
Q3 - Rate the following statements about the game: (Strongly agree, Agree, Somewhat agree, Neither agree nor disagree, Somewhat disagree)

- The game is too easy;
- The game is fun;
- I would play the game again;
- The game stimulates decision making under time pressure;
- The game is too long;
- This type of game is useful in the context of HE;
- The game provides visual metaphors of social realities;
- The game makes you think about the concepts and ideas discussed in the course.

Q4 - Rate the following statement: The '*Capture the Market'* game connected with the module's framework of structure, agency and ideas. (Strongly agree, Agree, Somewhat agree, Neither agree nor disagree, Somewhat disagree, Disagree, Strongly disagree)
Q5 - Rate the following statement: The '*Capture the Market'* game helped me to engage in and think about some of the key concepts from the module. (Strongly agree, Somewhat agree, Neither agree nor disagree, Somewhat disagree, Strongly disagree)
Q5.1 - Please elaborate further.
Q6 - Do you think that this game was an appropriate activity in the context of the module? (Strongly agree, Agree, Somewhat agree, Neither agree nor disagree, Somewhat disagree, Disagree, Strongly disagree)
Q6.1 - Please elaborate further.
Q7 - Would you recommend that this game be played by next year's cohort of LSE100 students? (Yes, Maybe, No)
Q7.1 - Please elaborate further.
Q8 - Any other comments?

Appendix 4

Questions – Teacher survey

Q1 - How would you describe your experience of managing the game '*Capture the Market'* and the post-game discussion in class? (Extremely difficult, Difficult, Neither easy nor difficult, Easy, Extremely easy)
Experience of managing game in class;
Experience of managing the post-game discussion in class.
Q1.1 - Please elaborate further.
Q2 - Were there any recurring issues/questions regarding the game instructions, game rules or score-sheets? Please give details.
Q3 - What aspects of the post-game discussion did you find challenging? How could this be improved?
Q4 - Rate the following statement: 'The students appeared to enjoy playing the game.' (Strongly agree, Somewhat agree, Neither agree nor disagree, Somewhat disagree, Strongly disagree)
Q4.1 - Please elaborate further, including any direct references/quotes from students.
Q5 - Rate the following statement: 'The students engaged with their team and in the game.'
Q5.1 - Please elaborate further.
Q6 - Which post-game questions seemed to gain the biggest response?
Q7 - Do you think the game increased the students' level of engagement with the module? (Definitely yes, Probably yes, Might or might not, Probably not, Definitely not)
Q7.1 - Please elaborate further.
Q8 - Were you able to cover all of the discussion points after the game? (Yes, No)
Q9 - Would you be happy to teach this game or other games next year? (Yes, No, Unsure)
Q9.1 - Please elaborate further.
Q10 - Were there any recurring patterns regarding game play and secret objectives?
Q11 - What were your tactics to draw out discussion and ideas?
Q12 - Any other comments? Including suggestions for improvements to the game and linking concepts to the game.

Applying STEEPLE to course and curriculum design

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Abstract

When it comes to course design in Higher Education, everything from learning theory and learning *design* theory to needs analysis and potential markets should shape our thinking. A group-based course-design task on the Post Graduate Certificate in Higher Education (PGCert. HE) at the University of Greenwich (UoG) provided the context within which my colleagues and I were able to bring a key aspect of our professional experience and expertise to course development. Our business background and an interest in strategic modelling in business led us to adopt the 'STEEPLE' model – an extension of the 'PEST' and 'PESTLE' models that preceded it – which is used in strategic decision-making in business worldwide.

Keywords: STEEPLE; strategy; environment; course/curricula design.

Introduction

I lecture Business Management courses to undergraduate students pursuing general and specific degrees in business management at a partner institution of the University of Greenwich (UoG) in Trinidad and Tobago; it is in this context that my colleagues and I found ourselves working towards the PGCert HE and the course design task within it. Putting aside the continuing debates about the merits and demerits of marketisation in higher education (HE) and the fractious arguments related to whether business practices suit HE provision, I believe that strategic modelling like this has a role to play in ensuring that courses, curricula and, indeed, entire programmes of study produce graduates who can take their rightful places in the world of work in the twenty-first century. This paper will demonstrate how the 'STEEPLE' model can be applied to enhance HE course and curriculum design.

The STEEPLE model is the latest version of a strategising tool that has evolved over the years, with adjustment whenever thinkers on the subject recognised and added a new aspect of the business environment to it. The acronym itself has accordingly evolved from 'PEST', to 'SLEPT', to 'PESTLE', to 'STEEPLE', to reflect these gradual additions. It is unclear who devised this model, or when, but it gained popularity from around the middle of the twentieth century and has been a fixture in business strategic decision-making ever since.

'STEEPLE' stands for **S**ocio-cultural, **T**echnological, **E**conomic, **E**cological, **P**olitical, **L**egal and **E**thical. These are the seven 'environments' within which any organisation (a university being no exception) must inevitably function. A thorough understanding of each of these environments is therefore critical to developing appropriate courses and curricula.

Applying STEEPLE to HE course and curriculum design

All organisations, including higher education providers (HEPs), must continually engage in strategising if they are to survive in a competitive environment. STEEPLE is one of many models that help decision-makers to develop and pursue their strategies systematically and HEPs have used it for years, though always from a marketing perspective – i.e. when seeing the institution as a business selling a range of products (their academic programmes) and competing with other such institutions for customers (students). I have not, in my research, come across any cases where it has been employed to assist in *designing* courses/modules and curricula. Though neither a course nor a curriculum design model itself, STEEPLE can be very useful in supporting those models which are – so as to achieve design of the most appropriate courses and curricula.

According to Shaw (2002) "continuous environmental scanning" and an "ability to anticipate changes in the future" are crucial for designing any curriculum. Beetham (2012, p. 3) seems to mirror these sentiments when she says: "The ultimate goal has always been to enhance the curriculum offer, making it more responsive to new markets and needs, more sustainably delivered, more flexible, and more attuned to the capabilities required by graduates in the 21st century". If curricula are indeed to be more responsive and flexible so that they can be more attuned to the ever-changing demands of society, then environmental scanning is indispensable – and the STEEPLE model can help to do it. 'Environment' in this context may be defined as all those factors and conditions that influence how people and organisations function. 'To scan one's environment' would therefore constitute close critical examination of any factors which impact upon one's operations.

Warren (2016) broadly classifies curriculum models as being either 'product' or 'process'. Knight (2001) and Hussey and Smith (2003) regard the former to be rigid and believe a curriculum model should be more flexible. So, since environments aren't static but quite dynamic, and since courses and curricula need to be adjusted accordingly, STEEPLE, as an analytical tool, may better suit a 'process' model.

As tertiary-level educators, we have objectives for our students that go beyond just ensuring that they 'land a good job', yet graduate employability will always be of paramount concern to us; our courses and curricula must therefore be shaped with that in mind. Lists of graduate attributes (those characteristics, skills and sets of knowledge that graduates are expected to possess upon completion of their respective programmes) now inform the student development policies and strategies of all HEPs. Gratton (2011) outlined five forces shaping the future of work:

1. Technological developments
2. Globalisation
3. Demographic changes
4. Societal trends
5. Low-carbon developments

Her list includes at least three of the seven environments contained in STEEPLE: the socio-cultural, the technological and the ecological.

In the following section, I shall show how each of these environments can, and do, relate to

the process of course and curriculum design and how my group scanned these environments as we worked on our project. It is vital both to acknowledge the overlaps between environments and to recognise how important those overlaps are.

The Seven Environments

Socio-cultural

The socio-cultural environment includes all factors relating to demographics, such as the size, structure and rate of growth of population and such things as traditions, cultural diversity and levels of education. Beetham (2012, p. 8) sees the "growth in the numbers of part-time, work-based learners…along with a wider range of approaches to study (flexible, part-time, online, etc.)" as factors that cannot be ignored when designing courses and curricula. For instance, the quantum of flexibility that one would include in one's curriculum would, to some extent, be influenced by such things as the ratio of work-based learners to full-time learners or the particular methods of study that are offered to, and preferred by, the students.

We are also witnessing a greater movement of people across international boundaries for the purpose of employment or study, or both, than ever before in our history; a migration which has already created many cosmopolitan societies around the world. This, no doubt, would have been one of the things that Gratton (2011) alluded to when she spoke of 'globalisation' as being one of the factors shaping the future of work. The fact that many HEPs now offer distant learning programmes, whereby students from any part of the world can pursue courses of study in other countries without actually leaving their own, adds to that globalisation phenomenon. The cultural diversity of one's student intake must therefore also be considered. This my group certainly took into account in designing our course for the mock validation panel. The course was culinary-based and sought to draw on the ethnic and cultural diversity of Trinidad and Tobago and to cater to such diversity among our students. According to Hockings (2010, p. 47), a student-focused approach to course design and delivery needs to be inclusive, so as to accommodate the cross-cultural nature of one's student population. It must aim to "anticipate, recognise and provide for individuals' specific physical, cultural, academic and pastoral needs." This can be done effectively only after a thorough scanning of one's socio-cultural environment.

Technological

When scanning one's technological environment, one would take into account the kinds and levels of technology available, their costs, their applicability to one's own context, their rate of turnover and so on. For a tertiary-level education institution, the most relevant category would be information and communication technology (ICT) and the two most common contexts to which it is applied are technology enhanced learning (TEL) and virtual learning environments (VLEs).

A distinction must be made here between technology *infusion* and technology *integration*, as the difference between the two has significant implications for TEL. The Higher Education Academy (HEA) of the UK states that, among other interpretations, the term 'TEL' "can also be used to refer to…learning **with** technology rather than just **through** technology." The infusion of technology in schools refers to teachers' and students' simply **using** technology to present and transmit ideas and information, whilst the integration of technology is about **engaging** students with those ideas, the technology itself being an integral part of the

experience. In other words, the technology must help to support and advance the pedagogy. In developing our course and its accompanying curriculum for our mock validation, therefore, my colleagues and I had to have a clear and concrete rationale for any technology that we proposed to use. According to Hos-McGrane (2012), until and unless schools have questioned and identified their reasons for using technology, they have not gone beyond simply infusing the technology. As the name implies, TEL is meant to give students a higher-quality learning experience.

If technology is indeed meant to enhance learning and the overall student experience, then courses need to be conceptualised and designed, and curricula developed, so as to have a synergic relationship with the prevailing technology. Beetham and Sharpe (2013), from a purely cognitivist standpoint, believe that no technological development has actually changed the fundamental capacities of human beings to learn. What technological advances have done, however, is to change, profoundly, "how ideas and practices are communicated, and what it means to be a knowledgeable or capable person" (p. 4). They argue that, owing to the fact that these technologies have significant impact upon the nature of knowledge in today's society, they also, by extension, have impact upon the nature of learning.

From a marketing perspective, the effect of technological advances is that they shorten product life cycles as consumers become drawn to the next new thing. Such a consideration is also applicable to course design, as course developers should take into account how relevant a particular curriculum will be in the next five to ten years, or even less, with respect to the technology being integrated into it. Such consideration is even more acute when the particular technology is itself the curriculum – i.e., a technology that graduates need to master for their intended profession/career.

Economic

The economic environment comprises all micro- and macro-economic variables, including interest rates, currency exchange rates, unemployment rates, inflation rates and GDP growth rates. Each one of these, *inter alia*, is very significant to a course or curriculum designer. The level of interest rates may affect students' ability to source loans to finance their education; foreign exchange rates may affect the intake of foreign students; inflation rates may affect how an institution prices its courses; and the general economic climate will certainly affect the demand for programmes offered.

The structure of an economy and the direction in which it is headed will inform the kind of graduate attributes that employers will seek and the particular skills they will want graduates to possess. This brings us right back to the issue of graduate employability that I touched on earlier. Faculties would need to design courses to complement and support the structure and growth of an economy. For instance, if an economy is essentially agrarian, then a number of agriculture-based courses, from the business of agriculture to the actual cultivation of crops, will need to be developed. Likewise, if an economy is based on tourism, then courses will need to be developed to satisfy the human resources needs of that sector. And, as these sectors change in one way or another, adjustments to courses and curricula will need to be made accordingly, even to the point of discontinuing some courses and introducing new ones.

Given the ever-increasing importance of human capital to macro-economic growth and development, Lees (2002) recognises the need for HEPs to place greater emphasis on the

employability of graduates. It would be virtually impossible to attempt to embed some employability dimensions into any curriculum without first diligently scanning the economic environment. Gedye and Ivaldi (2016) outline seven steps to enhancing student employability. Numbers two and three are, respectively, '*enable professional work experience'* and *'involve employers'*, neither of which can be effectively achieved without an adequate examination of the economic environment. With respect to involving employers, HEPs would first – before they can compile their lists of graduate attributes – need to consult with various employers' associations, chambers of commerce and government departments to determine exactly what employers are looking for in their employees. As far as enabling work experience is concerned, some programmes even demand a certain amount of practical learning and development in the workplace. For instance, students pursuing their degrees in pharmacology are usually encouraged by their faculty to seek vacation jobs in pharmacies and hospital dispensaries during their long summer break. Nowadays, it is also being increasingly recommended across all faculties that more opportunities be made available for a greater number of full-time students to gain some sort of work experience before actually graduating. Of course, the extent to which this is feasible would, in great measure, depend on the state of the economy at any given time.

Ecological

The ecological environment is extremely broad and comprises all physical surroundings, inclusive of their flora and fauna. It can also be taken to include the non-physical, such as climatic conditions. Generally, a faculty would not need to consider this environment when designing a course unless, and quite naturally, the course were directly related to some aspect of the ecology, such as environmental engineering or marine biology. Nevertheless, there can be some connection with other environments, such as the legal (with respect to environment protection laws) and the technological (as it may relate to issues like energy-saving technology).

Political

The political environment includes, and is influenced by, such things as political stability, political ideology and philosophy, political awareness and freedom amongst the electorate (if there is an electorate!), government policies and diplomatic relations with other countries. Some of these factors can also easily change with a change of government.

One of the things that course and curriculum designers would certainly be looking at is the set of government policies with respect to HE, especially those that deal with scholarships and other forms of funding for specific courses and programmes. Some courses are approved for funding whilst others are not. A faculty would therefore need to consider the specific criteria that determine the category into which any given course may lie. This could be significant for a number of reasons, including influencing the number of students who may enrol for a particular course. State funding, or lack thereof, was certainly one of the things that my group considered when designing our course and here was a typical example of how one environment could have impact on another. Owing to the economic downturn and decline in state revenues in our country, the government took the decision to reduce significantly its annual expenditure on tertiary academic programmes. We thus knew we had to come up with a course that would still attract the requisite number of students even though state funding was no longer available.

Some political developments can have very far-reaching effects on a society. As a case in point: Brexit. It would not be unfair to say that Brexit has caused a bit of a maelstrom on Britain's socio-political landscape. Every facet of life in the UK has been and will be affected by it. UK HEPs are particularly concerned over its possible repercussions for them. Richard Black, writing in the Telegraph (2017), says that what people are most worried about as far as Brexit and HE in the UK are concerned is the potential impact on funding, student numbers, exchange programmes and the quality of teaching and research collaboration. Student numbers and teaching and research collaboration are perhaps the two areas of deepest concern. University World News (2017) reports that the number of EU students applying to British universities in this current academic year fell by 7%, the first decrease in a decade. EU workers make up 12% of all UK universities' staff and 16% of their researchers are from the EU. Depending on the final terms and conditions of Brexit currently being negotiated between the UK and the EU, UK universities could lose out on some of this talent.

As to how all of this will affect the actual designing and development of courses and curricula at UK universities and colleges remains to be seen. We can be sure, however, that these activities will also be affected and that there will be implications globally – and therefore for institutions such as my own in Trinidad and Tobago, which partners with the University of Greenwich in the UK.

Legal

When scanning the legal environment, a university will look at all the laws and regulations that directly (or even indirectly) affect it. Immigration laws, especially those pertaining to foreign student visas, laws governing local student quotas and laws relating to minority student enrolment are just a few examples. Course designers must also consider regulatory bodies and accreditation boards, to ensure that their courses satisfy all the necessary criteria for approval. There may yet be some changes to certain regulations as a result of Brexit and HEPs in the UK will have to make the adjustments accordingly. Who knows?

Ethical

'Ethics' derives from the Greek word 'ethikos', which means 'custom' or 'character'. Broadly speaking, therefore, ethics may refer to human character and conduct and one's ethical environment would include all the beliefs, norms and values that help to shape that character and conduct. (Note the overlap between the ethical and socio-cultural environments.) But just how does the ethical environment influence course and/or curriculum design and how should academics deal with it?

Where course and curriculum development are concerned, Morgan and Houghton (2011) recommend an approach that "places the student at the heart of the design process" (p. 11) and embeds such principles that render it "anticipatory, flexible, accountable, collaborative, *transparent* and *equitable*" (pp. 12-13; Italics mine). The latter two speak directly to ethics. Warren (2016) cites Grundy (1987) and Cornbleth (1990), who came up with a typology for curriculum that classifies it as 'product', 'process' and 'praxis'. With the latter, there is an emphasis on "raising students' awareness of dehumanising, inequitable and undemocratic social practices and institutions and developing more egalitarian visions of society" (p. 14).

The challenge for course and curriculum designers is not how to proceed with their curricula in an ethical manner; that's easy enough. The question is: How do we use our courses to

raise our students' awareness of social injustices and develop in them more egalitarian visions of society? This might be easier and more natural for a course in philosophy perhaps, but how does one embed it in other disciplines? Each professional body, whether of accountants, attorneys or architects, has a code of ethics for its members and, I guess, one simply has to look to these codes to know just what needs to be included (explicitly or implicitly) in any course.

Conclusion

These seven different interpretations of environment really constitute the overall **external** environment of any university or even of any faculty. Of course, in designing courses and curricula, one also needs to scan one's **internal** environment, which includes a host of different things as well – from the physical infrastructure and the various facilities that go with it, to the human resources, ethos of the organisation and the systems and processes in place.

STEEPLE is one of many strategy models that a HEP can employ. Even so, it's usually used in conjunction with other strategy models to increase the effectiveness of one's decision-making. When used to support pedagogic theory and subject content considerations, it can provide an invaluable way of ensuring that key aspects are not ignored at the planning stage of any course or curriculum.

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Understanding the Big Picture: The VFX HE Online Mentoring Programme 2016-2017

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Abstract

VFX HE Online Mentoring Programme 2017 is funded by the British Film Institute (BFI) and UK Creative Skillset. The project is led by the University of Greenwich and supported by three BAFTA and Oscar award-winning VFX facilities: The Moving Picture Company (MPC), Framestore Visual Effects and (Oriental) DreamWorks. The idea behind this year's programme was to provide an in-depth understanding of VFX productions – especially internal VFX pipelines (the internal collaboration between departments of world-leading VFX facilities), professional advice and VFX recruitment – including of the required hard and soft skills. We believe that VFX HE Online Mentoring Programme 2017 has provided 1) a systematic chain of understanding and learning VFX and 2) a direct professional voice from the VFX industry to UK VFX learners in Higher Education.

Keywords: VFX; Online Mentoring; Higher Education

Project rationale

Visual effects (VFX) has been defined 'as any imagery created, altered or enhanced for a film, or other moving media, that cannot be accomplished during live action shooting…' (Fink, 2015). Visual effects, including 2D and 3D have been incorporated into many film productions, especially many modern feature films which rely heavily on them. VFX Higher Education (HE) is a very challenging subject, which requires academics to have excellent practical experience in the industry, in-depth knowledge of the history of film production and scientific understanding of the technical components of visual effects. As one of the UK's fastest-growing sectors, film made £4.3b in gross value added (GVA) in 2015 and '48 out of the 200 top-grossing films globally were made in the UK' (The British Film Institute, BFI, 2017). In order to keep the UK film industry vibrant, so that it will 'remain at the cutting-edge of the technological developments that are redefining our sector' (BFI, 2017), we need to provide the next generation of film-makers with proper training. The BFI (2017) has stated that there is evidence of widespread skills' shortages and that the educational sector is not equipping new entrants to the industry with the skills that they need. In addition, Livingstone and Hope (2011) say that the UK's visual effects industry, although 'enjoying very rapid growth, is having to source talent from overseas because of skills shortages at home'. The UK Home Office (2018), in its shortage occupation list (Table 1.), presents twenty-one VFX occupations, in five different sections, which offer foreign specialists work in the UK by providing exceptional visa rules. Such significant skills shortages should be alerting educators and the UK VFX industry as a whole to the fundamental need for appropriate VFX training programmes in this country – to boost student employability and offer the industry a supply of suitable candidates. Immigration Rules Appendix K: shortage occupation list:

Table 1 - United Kingdom Shortage Occupation List

Standard Occupational Classification (SOC) code and description	Job titles included on the United Kingdom Shortage Occupation List and further criteria
2135 IT business analysts, architects and systems designers	Only the following jobs in this occupation code: systems engineer in visual effects and 2D/3D computer animation for the film, television or video games sectors data scientist employed by a qualifying company, where the job requires a person with a minimum of five years' relevant experience and demonstrable experience of having led a team.
2136 Programmers and software development professionals	Only the following jobs in this occupation code: Senior developer employed by a qualifying company, where the job requires a person with a minimum of five years' relevant experience and demonstrable experience of having led a team. The following jobs in visual effects and 2D/3D computer animation for the film, television or video games sectors: software developer shader writer games designer The following jobs in the electronics system industry: driver developer embedded communications engineer
3411 Artist	Only the following jobs in this occupation code: Animator in visual effects and 2D/3D computer animation for the film, television or video games sectors
3416 Arts officers, producers and directors	Only the following jobs in this occupation code: The following jobs in visual effects and 2D/3D computer animation for the film, television or video games sectors: 2D supervisor 3D supervisor computer graphics supervisor producer production manager technical director visual effects supervisor
3421 Graphic designers	Only the following jobs in this occupation code: The following jobs in visual effects and 2D/3D computer animation for the film, television or video games sectors: compositing artist matte painter modeller rigger stereo artist texture artist

With the background described above, the BFI and Creative Skillset started to seek dedicated professionals and HE institutions to lead the VFX HE Online Mentoring Programme. As the funding project co-investigator in 2015-2016 and principal investigator in 2016-2017, I have successfully collaborated with Escape Studios in 2015 and, from 2016, have led the programme, which used a new teaching concept; the project was also

supported by three world-leading visual effects facilities. The following analyses of the project are based on the VFX HE Online Mentoring Programme 2016-2017.

VFX HE Online Mentoring Programme 2016-2017

The following section presents the case study of an online learning platform[2] which is currently open for eighty-eight students and their course leaders from six UK HE institutions.

How the project operated

As already indicated, the project was directly supported by three world-leading VFX facilities: The Moving Picture Company (MPC) London Headquarters; Framestore Visual Effects London Headquarters; (Oriental) DreamWorks (Shanghai). By providing detailed information about such inner workings of VFX Facilities as VFX pipelines, standards, VFX roles and collaborations between departments, the programme covered a series of exciting professional information. Through this learning opportunity, participating students gained in-depth knowledge and understanding, both of how VFX facilities work and also of the hard and soft skills required by potential employers.

The 2016-2017 programme included two major parts:

Part one: online self-learning

All participating students and their course leaders could access up to twenty-two exclusive pre-recorded self-learning videos – created by three BAFTA and Oscar award-winning VFX companies – which covered a series of key stages of visual effects production pipelines inside two of these large, world-leading VFX facilities – The Moving Picture Company (MPC) and Framestore. The MPC videos focused on VFX in high-end feature films; those by Framestore cover VFX in both high-end feature films and TV commercials. The MPC videos focused on VFX in high-end feature films; those by Framestore cover VFX in both high-end feature films and TV commercials. The third company, (Oriental) DreamWorks, produced a series of videos to demonstrate some critical tasks for 3D animated feature films. Such contrasts in focus gave learners an excellent opportunity to compare how such significant VFX companies approach their productions and difference of VFX production pipelines between companies.

Part two: online live Q&A sessions

This part consisted of online mentoring Q&A sessions. At the end of each learning week, we invited MPC and Framestore heads of department and senior professionals to answer questions based on the week's content. Through Adobe Connect, students could directly ask these artistic specialists specific questions and then instantly receive answers from them. The online Q&A sessions provided an excellent opportunity for all students to engage interactively with the programme and, since all the sessions were recorded and made available on the programme website, those not able to attend the live sessions could nevertheless still watch the recordings at their own convenience.

[2] http://vfxhementor.co.uk/

Research and teaching concept

Today's modern film and game industry have become more complicated than ever before, visual stories presented to audiences through media platforms are the results of the collective effort of teamwork. Production pipelines play a critical role in balancing production quality and efficiency. For students, 'understanding how production pipelines work increases their chances of employment. One of the most common failings of interviewees is lack of understanding of the production process' (Dunlop, 2014). VFX in higher education is traditionally divided into creative or artistic education, as well as software and technical training. However, VFX artistic professionals must have a solid understanding of two aspects of their work: production pipelines and scientific factors – especially in high-end feature film and TV commercial production – if they are to be able to efficiently deal with varying daily production demands of colleagues, teams and departments. Insufficient educational emphasis on the understanding of these two critical aspects of VFX production may trap a large number of students into focusing on new features of fast-updating software instead of on the goal of becoming a creative artist with a critical mind and, ultimately, a skilful VFX operator. With the phenomenon of this philosophy in higher education, as academics, we probably should ask ourselves what we really expect from our next generation.

The following diagram (left and middle in Figure 1.) shows a comparison of current teaching concept and the VFX industry production concept in reality. The third diagram (right in Figure 1.) indicates an ideal teaching concept in VFX higher education.

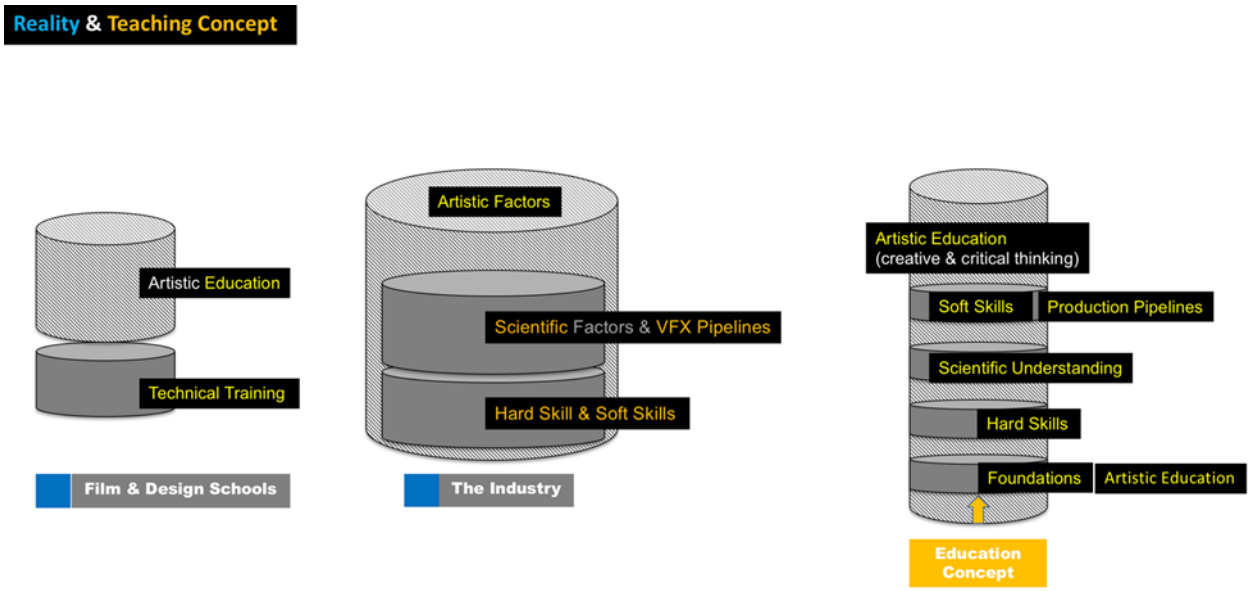

Figure 1: A comparison of reality and teaching concepts

The VFX HE Online Mentoring Programme 2016-2017 has covered eighteen key areas of VFX productions and included pre-recorded videos, interviews and online live Q&A sessions from thirty-two dedicated professionals in different departments at three world-leading VFX facilities. From the following feedback from our students who participated in the programme, we can clearly see how students think about our teaching approach in the programme 2016-2017.

VFX HE Online Mentoring Programme 2016-2017 students' feedback - Link. This feedback has also been attached as Appendix 1.

Technology-enhanced learning

The technology-enhanced learning in this project is reflected in every part of the programme, especially the live Q&A sessions in each learning week. We invited up to fifteen senior artists from different departments of MPC and Framestore to interact with participating students in online live Q&A sessions. This approach provided a direct communication opportunity between employers and potential new graduate jobseekers who could instantly receive professional advice and thus more confidently, and at an early stage, prepare the skills and knowledge needed for their future job applications.

Sustainable learning

After completing the programme, participating students may, in order to reference and refresh their learning, continue to access the project website and all recorded videos, including recorded Q&A sessions, until August 2019. Furthermore, since all their names are listed on the official project website, they can offer VFX studios intent on graduate recruitment some very compelling training evidence in support of their applications.

Overall, the idea of, and approaches used in, the Creative Skillset VFX HE Online Mentoring Programme are fully adaptable and so it can be deployed in similar HE subjects across the globe.

Internal VFX course construction integration

VFX HE Online Mentoring Programme 2017 learning contents have been seamlessly embedded into three internal VFX courses at the Department of Creative Professions and Digital Arts, University of Greenwich. All second-year students in Film Production and 3D Animation are given free accounts in order to access the programme and all its online learning content – for them an excellent background study platform.
Similarly, participating institutions can subscribe to all teaching materials and embed them into their VFX-related programmes as an additional background learning platform.

In addition, all participating academics (course leaders) from the UK HE institutions have been given free accounts to access the learning videos. We hope that this provides them with an opportunity to listen directly to the industry's advice and improve VFX-related courses in their institutions.

Research findings and suggestions

Finding one: recruitment challenge

Although VFX HE Online Mentoring Programme 2016-2017 has received very positive student feedback, we indeed faced challenges to effective communication with potential participants during the programme recruitment period. Though our initial recruiting approach was to contact course leaders in VFX-related courses approved by Creative Skillset, this method didn't work as well as we expected: finding the right person to contact proved difficult; course leaders contacted did not respond efficiently to our emails – a significant problem as we had no other means of communicating directly with potential participating students from other HE institutions.

Suggestion

Our suggestion based on this finding is to establish a formal agreement between Creative Skillset and UK HE institutions. If relevant courses have been approved and ticked by Creative Skillset, HE institutions should take responsibility for facilitating participation in related Creative Skillset funding projects. We believe this suggested solution could prevent the embarrassment of not being able to find participating students from Creative Skillset-approved HE institutions. Additionally, HE institutions should, every academic year, provide Creative Skillset with the email addresses of both students and approved course leaders. This would make it easier for principal investigators (PI.s) of Creative Skillset funding projects to contact HE institutions and their students for purposes of recruitment.

Finding two and suggestion: engagement

Course leaders should be aware of their responsibility to encourage students to participate in Creative Skillset funding projects. Disengagement is a common problem in HE. McGrath states: 'learning is influenced by the student's whole experience at University' (McGrath *et al*. 2015, xi). Course leaders in their institutions are a key factor in influencing student learning and proper encouragement may have a positive influence on students' learning engagement.

A proposal for VFX HE Online Mentoring Programme 2018-2019

On account of the positive feedback from participating students, HE institutions and the industry partners, we shall continue to develop the programme from 2018.

As a second part of the programme, the VFX HE Online Mentoring Programme 2018-2019 will be aiming at hands-on practice. Participating students will be assigned to and directly mentored by professional artists in different departments of world-leading VFX facilities to finish a series of VFX projects; this will provide students with an excellent opportunity for practical implementation of what they learnt from part one of the programme 2016-2017.

We shall continue to develop the programme in each academic year. As the project PI, I should be delighted to discover further funding opportunities for this project from Creative Skillset or other research funding organisations. We believe that the increase in participating membership by both UK and international HE institutions will benefit greater numbers of students passionate about VFX and eventually help the development of the UK's VFX

industry. Additionally, a university that leads this project will also quickly build up a reputation as a leading university in VFX HE.

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Appendix 1.

BFI & Creative Skillset Funding Project:
VFX HE Online Mentoring Programme 2016-2017
Project PI: Dr Jin Zhi

Anonymous feedback from participating students:

'In my opinion, the programme has been absolutely amazing, it showed the pipeline in a simple way to understand and it allowed us to ask questions. I found many of the videos both inspiring and informative. I'm aiming to become a compositor so the programme was perfect for me as it had the MPC (tutorial like) compositing videos. Although I believe it would have been nice to have had videos like this for other departments too, so that we get an overview of what the tasks are like in every department. Many students still don't know what area to specialise in yet, so having tutorial like videos on every department would be a great help I think.'

'It was great to meet artists who actually work inside the biggest VFX known companies. It helped knowing how these artists got to that stage and what jobs/experiences they had before. It would be nice to get more workshops about animation.'

'I thought the VFX HE Mentorship was interesting and gave a great insight into the creative industry. It provided a good experience of what is expected in any given role and provided a wealthy knowledge from different companies. I would of liked to have seen perhaps for the mentor programme to touch a little more on 3D development as this was my main field. I found the online Q&A to be very helpful and was a great source for getting any question answer by people in the industry. I liked the fact that these guys could spend some time with you and give you the help or direction you needed. I valued their honesty and the expectations of working in these roles.'

'The program was interesting and informative, it allowed me to obtain some knowledge on what each department does, as well as give me some insight on what role I would like to take on after graduating. Thank you again for the Part A of the Mentoring program, look forward to Part B next year.'

'An excellent opportunity to have a closer look at the industry standards and pipeline. Recorded sessions very clear and easy to follow. I have learnt few new tricks for animation. Overall a great mentoring session including excellent live Q&A. I am very pleased I have participated in this project.'

'I found the content created by the participating companies to be very interesting and helpful to me build a better understanding of the processes involved in a VFX production. I am mainly interested in modelling/texturing and the creation of assets, so felt that perhaps this was one area of the course that wasn't really covered as in depth as the other disciplines on show. I thought the Q+A sessions were very valuable to get a better insight as to what is required with regard applying for internships and academy programs etc.

I feel the course has definitely helped increase my understanding of the VFX pipeline for film production. I will look forward to attending part two next year.'

'It was good, I really liked getting to know more about my chosen industry and it helped me focused on what I want to do and how I should go about achieving it.Q and as were the best bits.'

'Extremely helpful and essential information for anyone entering the VFX path.'

'I enjoyed VFX HE Online Mentoring Programme because it showed me how the VFX industry works. I learn a lot about the importance of pipeline in industry which changed the way I think. I also enjoyed the video tutorials from the professional artists, some were quite detailed. I believe this knowledge will help me in future when I get to do real work for company. This was my first time using Adobe connect so I feel I get to know about it too. Thank you for giving me this opportunity to participate. I hope I can learn more from you in 2018.'

'Overall, I found the course very interesting and very insightful. I liked that it looked at many various aspects of the pipeline and has even opened my eyes into trying other skills and looking at other departments. My only downside was the lack of practical. I understand how important the theory is but it would have been nice to put some of the videos to work.'

'I learnt quite a lot from videos provided, I think they cleared up some of the worries I had regarding the industry. The only feedback I have for the course is that some of them are overtly long and it is a little hard to focus for that long. Maybe for next year it would be good to split those into separate parts. Thank you!'

'I thought the whole programme was an invaluable experience and this is definitely what most students are missing in theirs course curriculums

- expertise of people from the industry. Also, please keep recording live Q&A sessions, great way not to feel left out if unavailable to attend.

Don't think the programme could have been changed or moderated further for better experience; the content provided was in depth and clear, explained a lot of unclear areas of VFX. Though would have been nice to see a video about asset building (modelling).Thank you again for everyone's time in making this.'

'Very insightful video lectures and the Q&A have been quite helpful when exploring different options for getting in to the VFX industry. Being able to learn from the industry experts and their view on the industry has helped me broaden my understanding. I'd love to have had more sessions and probably more engagement with the experts, perhaps have their social media (e.g. twitter) or contact to be able to interact with them more after the Q&A.'

'I think the programme has been beneficial for having an idea of how things work in the VFX industry, and, furthermore, to receive a professional point of view to significant questions. Personally, I can't wait to see the 2018 programme. The thing to improve would have been

the duration of the course; personally, I think that it could have last a little longer, as it was fascinating. However, I understand that artists are very busy therefore I am grateful for these videos.'

'Concise information about the roles and structure of the two companies involved with VFX. Overall enlightening with very useful dialogue during the live sessions. Of particular interest was the information pertaining to the various background experiences of employees and their respective career journeys, also that of the continued development through in house training. The dedication and commitment of the interviewed participants to their roles were clearly apparent and I found their insights to be frank, open and demonstrated their professional mind set. In terms of what I have taken away from this Programme is a clearer understanding of the VFX industry, the roles within and the commitment required. Though my interests lie primarily in Concept Design and 2D animation, I should like to continue learning and developing my skills in general.'

'This programme was tremendously helpful in allowing me to gain a greater understanding of how the VFX Industry works and the various roles in the industry. I look forward to the next part of this VFX training programme in 2018.'

At the time of this document was made, we continued receiving feedback from more student about the programme...

Lights, camera, action research! Engaging filmmaking students in feedback

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Abstract

This paper is a response to repeated National Student Survey evidence of dissatisfaction with 'assessment and feedback' in undergraduate film production courses, as well as an expression of genuine interest in how to address the characteristic indifference and laissez-faire attitude of students engaged in filmmaking. It explores how filmmaking students may be effectively engaged with feedback by undertaking it themselves before I issue it formally as their tutor. As opposed to a formative exercise, this activity was undertaken just minutes before their 'live' summative feedback. The intention was to create autonomous, independent and proactive learners from the start of their degrees.

The research forming the basis of this case study, which I undertook in a previous role at a UK higher education institution, identifies that *critiquing without knowing what action to take* is a barrier to students' engaging with their feedback and that *being able to maintain a distance from and perspective of their work* enables students to take responsibility for themselves. It finds that *in order to move on from mistakes, feedback needs to be straight to the point and clear, in order to create an action plan to improve*.

"Houston, we have a problem" (*Apollo 13*, 1995)

The study was prompted by my observation of a change in engagement with feedback given to students from tutors. There was a less positive engagement by students with my feedback; other lecturers in my department voiced similar concerns that students were making complaints about feedback. As a consequence, I determined to undertake research into my own practice, as simply and effectively as possible, so that the method could be applied by others in my department. Instead of running a survey or asking the members of a staff/student committee for their opinions, I wanted to understand what lay at the root of the problem.

"Toto, I've a feeling we're not in Kansas anymore" (*Wizard of Oz*, 1939)

Literature review

Bloom's 'cognitive' and 'affective' domain taxonomy volumes (1956 and 1964) detail clearly how to assist the student in progressing through higher levels of abstraction. The 'affective' domain includes as its final three stages: valuing, organisation and characterisation by value set. Pratt's 'Good Teaching: One Size Fits All?' (2002) also lays out a clear, sequential teaching theory which fits practically alongside Biggs and Tang's 'Teaching According to How Students Learn' (2002), with its focus on theories of teaching and the 'Cognitive Level of Learning Activities' chart, again a practical guide alongside Bloom's 'Cognitive Taxonomy'. Whilst these theories focused on the actual process of learning, they did not

include the 'affective' domain details of organisation and application – I felt that both of these aligned well with making the study part of the class; I wanted to ensure I was using, in Pete Boyd's words, a "transformative approach to thinking about the purposes of assessment" (2007, p. 7).

Meer and Chapman (2013) argue that students' understanding of marking criteria make them active participants in the process, encouraging a community of practice. This is supported by Rust *et al*. (2005), who suggest that tacit knowledge is gained by participation rather than instruction, and Gordon (2010), who states that students are far more attentive when assessing their peers. Walser (2009) concurs, as well as Hattie and Timperley, who also state categorically: "Feedback is one of the most powerful influences on learning and achievement" (2007). Sadler (1989) even goes as far as to say students "must already possess some of the same evaluative skills as their teacher". He argues that they are already generating their own feedback.

In outlining the seven principles of good feedback, Nicol and Macfarlane-Dick (2006) are also positive, describing feedback as inspiring independent students and therefore self-regulated learners concurring with Bloom. They also allude to its deeper influence which "shows that feedback both regulates and is regulated by motivational beliefs" (*op.cit*., p.201). Hattie and Timperley (*op.cit*.) agree, proposing that increased effort and the taking on of more challenging tasks is inspired by correct use of feedback. If students also believe that they can achieve when the intended goal is clear, they are also more likely to increase their effort (Kluger and DeNisi, 1996). Hattie *et al.* also say that effective instruction is key to enhanced learning so that "teachers can create a learning environment in which students develop self-regulation and error detection skills" (Hattie, Biggs and Purdie, 1996). Hattie (2008) puts feedback at the top of his education table.

This sense of role reversal is thought of positively by Campbell (2015), who argues that tutors should not be scared of giving up their own role, inspiring greater student independence, engagement and interaction. Although my research is stand-alone, it is part of a scaffold process of the type recommended by McNiff (2005).

"Now which way do we go?" (*Wizard of Oz*, 1939)

Methodology

Using a summative script assignment submitted three weeks earlier, the students were given specific instructions to write their own feedback online, by re-reading both the work they had submitted and the original assessment brief for the module. They then had a personal tutorial with me, to receive their actual summative feedback. The process was then completed by a digitally-recorded focus group.

Participants

I used a group of five foundation-year students, studying BA Film and Television Production, before they began their first year at undergraduate level. This age group was chosen (as opposed to level 6, for example) because, as Meer and Chapman (2014) note, students "would benefit more if this engagement with the marking criteria could happen earlier in their student journey".

Setting

The intervention and data collection took place in a versatile computer room, a location familiar to the students and often used for teaching and learning.

Change Process

My intervention involved students' engaging in tutor activities by marking and giving their own work feedback just before they received their official feedback from me. The assignment they had completed was a five-page script, with appropriate industry formatting. Instead of getting their grade and feedback straight away, as they usually did, I wanted them to engage in the process actively, to encourage deep learning and engage with the higher cognitive levels. I issued a number of specific, logical and progressive steps to go through for simple completion of the process:

1. Read your scripts out loud in pairs.

2. Read the brief on Blackboard that you were originally set.

3. Write a short summary of the aspects of the brief you think you have hit.

4. Write a list of positive and negative bullet points.

5. Write a summary paragraph, focusing on the positives of your work and what you think you need to work on, moving forward.

Data collection

The students submitted their feedback reports and then participated in a digitally-recorded focus group to discuss their thoughts about the process. Before the focus-group session began, they were asked to answer two written questions:

- What worked about the process?

- What didn't work about the process?

The focus-group discussion was then left deliberately open, to allow them to explore their own experience of, and reflections on, receiving feedback throughout the foundation year and to encourage whatever they wanted to speak about to come up. Using thematic analysis, looking at the strengths and limitations of the study design, I then examined the data. The discussion is illustrated by a selection of quotations from anonymised student feedback.

"You talking to me?" (*Raging Bull,* 1980)

Writing their own feedback

Though, at first, the change process seemed boring to them and there was a lack of enthusiasm, the structure worked once they started to engage themselves practically and

write. My having laid out how I composed my feedback to them gave them a framework, the blanks of which they could fill in to build their own critique for themselves. A yet greater enthusiasm was apparent as they got to stand on their own two feet and take this in to the focus group: they all had something to bring through their experience.

What also worked was the similarity between their feedback to my own. However, in many circumstances, they were far more critical than I was about their own work. This worked both ways, because then when it came to listing what did work (I had instructed them to do that at the end of their feedback), any self-praise derived from reasoned evidence, not from ego. They were able to analyse and delineate, not merely to praise and be positive for the sake of it. This produced some exciting action plans for moving forward, as illustrated by this comment from one participant:

> *"On the positive side the storyline was strong and interesting and had potential to be good. However to make it more exciting the dialogue and descriptions could be more emotionally descriptive to make it more exciting and keep the audience interested."* (Student B).

This was above and beyond what I had expected and showed so many attributes for a level 3 student! First, she had stepped back and analysed; second, she had been accurate and articulate in her critique; third, she was able to get beyond simple praise and inspire and encourage herself to move forward from a place of confidence, certainty and deep learning. Instead of directing, I had therefore become more a facilitator, a guide alongside her much more self-determined way ahead.

Focus Group student themes

Independence

The students liked being able to discover their own strengths and weaknesses for themselves. There was a sense of empowerment in their answers. None of them complained of feeling restrained, only of wanting more detail. They were able to begin to express what they did not want as well as what they did; *clear and straight to the point* was a common theme: "give me something I can work on" (Student B). In contrast, there was a severe dislike of "critique for critique's sake", without knowing the 'how' of how to change it (Student C). Though Student G, confused, expressed a minority view – "What can I do about it now?" – his comment did reflect a more prevalent attitude: *if I can't do anything about it now, then what use is it*?

"Well, nobody's perfect" (*Some Like it Hot*, 1959)

Student G felt that his feedback was neither detailed nor harsh enough; he then described how another tutor's feedback was too harsh and unjustified. When I pointed out that these two views were contradictory, he fell silent and others began to talk. After some quiet reflection, however, he did seem to have an epiphany, saying that, from the other tutor, there was nothing he could work with, only criticism, with no plan of how to do better; he had wanted detailed feedback, but detailed feedback that was actionable and not simply negatively critical. He was able to analyse and articulate to me the practicalities of his emotions, instead of just getting angry – an 'affective' domain characteristic. He was therefore able to communicate exactly what his tutor couldn't. This was exciting! The

process he went through in order to express what he felt was exactly what he needed his tutor to do about his work – not just to "slag it off", as he put it, but to tell him practically what he needed to do to move forward.

The message coming back from the students was therefore clear: feedback was only useful if there was something they could do about it. Consequently, I found myself determining how best to incorporate constructive feedback into the next academic year's sessions. As Hattie and Timperley (2011, p. 104) conclude, 'It is the feedback information and interpretations from assessments, not the numbers or grades, that matter... feedback…one of the most powerful influences on learning, too rarely occurs".

Empowerment

As a result of the reflection, there was a progressive sense of empowerment, directness and honesty towards me. They began talking about my early lectures, saying that they had been unsure of me at first, before detailing how each session built on those preceding it, so they began to understand and have more confidence in my methods. That I taught them progressively and fairly made sense and worked.

Valuing their Learning

Overall, there was a sense of enhanced understanding amongst the students: they displayed characteristic 'affective' domain qualities; they began valuing their feedback and their role in it. This was displayed in their critiquing another lecturer's style. Once they had been 'on the other side' (writing feedback on their own work) and then been given the space by me, they were able to analyse – a key concept of 'cognitive' domain activity.

Focus group – tacit observations

In the focus group, there was an initial silence and nervousness. As a result, I had to emphasise how important it was to the effectiveness of my research and to my subsequent actions that they be absolutely candid. Once the discussion was not centered on me – and clearly that was an issue from their body language and tentative answers – they were able to relax and analyse properly. Even those who did not contribute were visibly nodding and taking part emotionally, if not vocally. The consensus was that the change had worked because they could distance themselves from their own work, take a step back and analyse.

It was apparent that they felt listened to and knew more about themselves and what they needed, analysing and effectively engaging in a community of research amongst themselves. They were able to distinguish what feedback they needed and – crucially in student G's case – the 'why'. Through the process, they developed experientially the knowledge and confidence to practice what it took to use feedback and move on. What I learnt was that separating them from their own work, and encouraging them to step back and be objective, defused negative criticism.

One of the barriers to feedback in my experience can be students' disagreement with or sensitivity to negative comments about their own work, especially if they are not expecting it and have spent a long time doing it. This change process enabled them to see for themselves, before they simply 'got their mark'. The tacit implication is that students with this degree of self-knowledge will be willing to engage in enquiry and analysis as a result.

The research showed a positive change because, despite initial resistance from the students, they did grasp that it was a good idea; furthermore, they learned, experientially, from the inside, not simply by being told: learning from the inside out, instead of outside in; showing, not telling.

Another observation that arose from this research exercise was the considerable negative commentary and lack of positive commentary, about other lecturers who were not present. This is clearly a factor with significant implications for the information gathered: whereas the feedback about me individually was balanced and limited, the feedback about a lecturer who had taught them the previous semester was much more extensive and trenchant. I am led to conclude that analysis of my practice might have been more informative had the group discussion been handled by another tutor in my absence, thus opening up a freer space for them to scrutinize my methods.

“Now, where was I?” (*Memento,* 2000)

A key conclusion from this research is that being able to maintain a distance from and a more impartial perspective upon their work, enables students to take responsibility for themselves. Students emphasised strongly that in order for them to move on from mistakes, the feedback needs to be clear, frank, pertinent and constructively evidenced so that they can plan and carry out strategies for improvement.

This research shows that simply critiquing, without knowing what action to take, is a barrier to students’ engaging with feedback. Being able to maintain a distance gives them perspective on the work they have done. It also shows that students engage in feedback and take ownership of the academic process for themselves when they get access to stepping into the shoes of the tutor and are thus empowered.

Ownership and independence can be created by issuing a student responsible tutor orientated task, stimulating enquiry and analysis as a result. As these are aspects of Bloom’s ‘cognitive’ domain, such a task is immensely useful in progressing students’ learning, by engaging them with feedback. They can take a step back, in order take an effective leap forward.

"Where we go from there is a choice I leave to you." (*The Matrix*, 1999)

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Evolutions of Carpe Diem for learning design

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Abstract

This paper presents a comparative case study from two UK universities that contextualises their use of the Carpe Diem Learning Design methodology. The aim of the case study is not to share an evaluation of the Carpe Diem process *per se*, as both institutions are confident in the validity of the design process it scaffolds. Rather, it explores the different contexts, institutional drivers and evolutions of the original process in both institutions: supporting the development of online programmes at Glasgow Caledonian University and blended programmes through the CAIeRO framework (Creating Aligned Interactive educational Resource Opportunities) at the University of Northampton. It then shares common challenges and opportunities; in particular the use of Carpe Diem to support open educational practice. The aim is to contribute to a continuing collaborative narrative about the processes involved in implementing and embedding a formal learning design process such as Carpe Diem.

Keywords: learning design, digital learning, open education practice

Introduction

As higher education (HE) evolves to take account of various internal and external drivers, the process of curriculum design is becoming increasingly important to learning and teaching practice (Conole, 2013). Many of these drivers, not least of which are student and employer expectations regarding digital capabilities, emphasise the need for the design of effective student-centred learning experiences, in or out of the classroom. By engaging academic staff teams in collaborative approaches to the design of these experiences, creativity and innovation – in learning, teaching and assessment – can be encouraged and the digital capabilities of both staff and students enhanced. 'Carpe Diem' (Salmon, 2013) is one such model, which provides a two-day structured workshop framework for a team-based approach to curriculum design.

Since its inception over fifteen years ago, Carpe Diem has been adopted and adapted by a number of institutions in the UK and Australia to support teaching staff in designing and re-designing courses (Conole and Wills, 2013; Dempster *et al.,* 2012; Salmon and Wright, 2014). To demonstrate the flexibility of this approach, this case study will look at two examples from UK institutions: Glasgow Caledonian University, one of the pilot institutions for the original Carpe Diem process in 2002, and the University of Northampton, which joined the ADDER (Assessment & Disciplines: Developing E-tivities Research) project in 2008 (Armellini and Aiyegbayo, 2010). This case study will review how each institution has contextualised the process, to align with specific institutional priorities, and explore the lessons learned so far through their experience of supporting course design.

Context

Example 1

Glasgow Caledonian University (GCU) is a modern Scottish university with over 16,000 students. GCU was one of the pilot institutions for the original Carpe Diem process in 2002, when Professor Gilly Salmon, the originator of Carpe Diem, was appointed as visiting professor in the Caledonian Business School. At that time, the University was introducing a new VLE (Blackboard). This circumstance presented an ideal opportunity to engage colleagues in curriculum design to support the development of blended and online programmes. The outcomes were positive, building confidence among academics and encouraging creativity in learning design (Salmon *et al*., 2008). For the next few years, Carpe Diem continued to be used, primarily in the Business School, and also underpinned the re-design of assessment practices at GCU during the Re-Engineering Assessment Practices (REAP) project, funded by the Scottish Funding Council from 2005-7 as part of the e-learning transformation programme.

Example 2

The University of Northampton (UoN) is one of the youngest universities in the UK and has over 10,000 students. We adopted the Carpe Diem framework and began adapting it as 'CAIeRO' (Creating Aligned Interactive educational Resource Opportunities), in 2008. Initially, the CAIeRO workshop was adopted by subject teams involved in the pilot project, who developed pockets of good practice. It wasn't until the creation of our Institute of Learning and Teaching in 2012 that we began promoting it as our institutional approach to course design.

UoN is currently focused on an institutional curriculum change project, driven by our Learning and Teaching Plan and the move to our new 'Waterside'[3] campus in September 2018. The plan, which is informed both by research into effective pedagogy and by an increasing need to develop the digital literacies of students and staff, outlines our institutional commitment to 'active blended learning' (ABL) as the norm across all our taught programmes. Delivering on this means re-designing much of our learning and teaching as well as moving away from traditional lecture-based teaching to more small-group, interactive and student-centred approaches. CAIeRO is a good fit for this strategy, because of the emphasis on "learner-centred, task-based learning design" and effective use of learning technologies it inherits from the Carpe Diem model (Armellini and Aiyegbayo, 2010).

Implementation

Example 1

At GCU in 2014, there was a renewed drive across the University to increase the number of fully online Masters-level programmes. In response to this, the central Blended Learning Team revisited the original Carpe Diem process and over the past three years has been developing it into a flexible learning design methodology supportively aligned to the strategic aims of the University.

[3] http://hellowaterside.northampton.ac.uk/

In 2015, the University formed a partnership with the African Leadership College (ALC)[4] to deliver a range of (mainly online) undergraduate programmes to that institution's new campus in Mauritius. To support this new initiative, a range of curriculum support opportunities for staff was introduced, building on earlier revisions of the Carpe Diem process. A range of flexible support options, with face-to-face workshops followed by online support and guidance and a peer-review process, was initially made available to staff involved in the ALC initiative and, subsequently, to all staff.

Example 2

At Northampton, CAIeRO is integrated into our wider staff development programme as an option for developing learning and teaching practice. The teaching staff at Northampton come from diverse backgrounds and include those with many years of teaching experience as well as those fresh from graduate study or from industry. Not all of these have had opportunities for formal development in designing taught courses or in active and blended learning approaches, so the requirements of the curriculum change project have had considerable implications for staff development. To support this, the University introduced dedicated resources: currently, four full-time members of staff employed as 'Learning Designers', with a major part of their role focused on facilitation of CAIeRO workshops.

CAIeRO has also been embedded into our quality-assurance and enhancement processes. Engagement with the process is mandatory for validation of new modules and programmes and it is recommended as one of a suite of available quality-enhancement options for Periodic Subject Review.

Analysis and evolution of the Carpe Diem model

Example 1

Over the past year, a new 'Academic Quality and Development' department has been formed at GCU. As part of this restructuring, there has been a refocus of professional development opportunities, including a core focus on curriculum design. One of our initial actions was to implement a survey on the digital capabilities of academic staff, to establish a baseline for future CPD priorities. As part of this, we asked staff to rate their confidence levels in various aspects of designing and teaching online modules, including curriculum design. As shown in Figure 1, overall confidence levels were relatively low, with only 42% of respondents identifying themselves as highly, or very, confident in designing the curriculum for online modules. In all other aspects, including the design of online learning activities and assessments, results showed that the majority of respondents felt only slightly, or not at all, confident.

[4] https://www.gcu.ac.uk/theuniversity/international/alc/

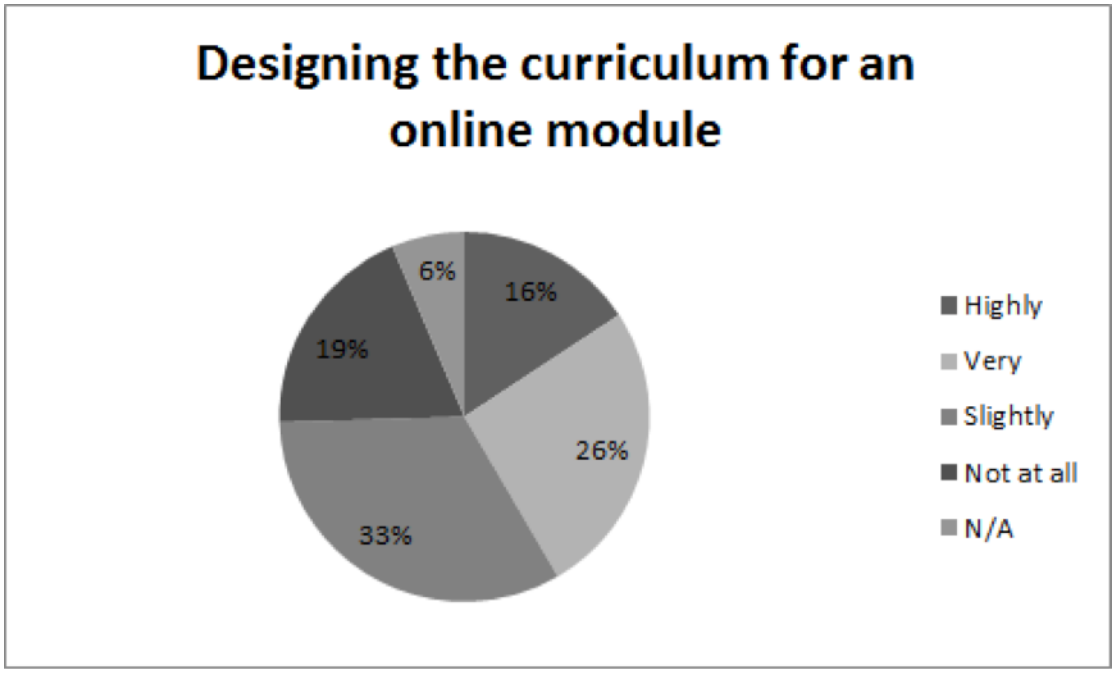

Figure 1: Staff confidence in designing and teaching online modules

The survey results informed the development of a Digital Learning Implementation plan which highlights curriculum design for blended and online programmes as a key priority for the University, providing justification for the further roll-out of the Carpe Diem curriculum design model.

Carpe Diem has been incorporated into an overarching learning design workflow which ideally starts with a face-to-face Carpe Diem full-day workshop. Owing to time pressure on staff, we have reduced the face-to-face session to two hours. Such a reduction of the workshop has been possible because our development of existing modules has fixed many of their design elements, including learning outcomes. For example, in the case of the ALC modules, the focus was on transposing existing campus-based content and activities to equivalent online ones. For most module teams, the main takeaway from the session has been a shared overarching module design in which key points of interaction include student activities, summative assessment and feedback opportunities.

Staff have been encouraged to use Trello (an online collaborative task-management tool) to convert their initial paper and post-it note storyboards into a working, collaborative online document. The uptake of Trello has surpassed initial expectations and has allowed staff not only to share new designs but also to provide a way to map other existing modules.[5] Trello boards provide a simple, shareable view of a module design.

Once a Trello board is created and populated, prototyping of the course design begins. Initially, we had encouraged use of Coursesites, the open version of Blackboard, but, in practice, most module teams have either used a community area within our VLE or the

[5] http://edshare.gcu.ac.uk/3170/

actual module shell. It is at this point that, in general, staff start to work with the Learning Technologists in their schools to develop learning activities and course content.

As part of the ALC project, all modules are required to go through a light-touch quality-enhancement process. To support this process, a peer-review checklist, based on an agreed set of characteristics and standards, has been developed. This has enabled subject specialists and the Academic Development team to review modules in terms of both the appropriateness of overall learning design, and core content and activities. The checklist has proved popular with academic colleagues, a number of whom have started to use it with other non-ALC modules.

At GCU, evaluation and review is linked to the University's existing module evaluation process. When required, we are able to adapt and extract relevant elements of the Carpe Diem process to focus on particular elements in a programme – for example, assessment and feedback, if that is what is required by a review process or highlighted as an area for development by a module team.

Over the academic year 2017/18, the Academic Development Team is working with Schools to offer a more structured approach to module/programme/curriculum design to support the University's aspirations for digital learning. We shall be working with nominated module teams as they design new programmes or refresh existing ones in blended and online mode. Working with the teams, we shall provide a range of flexible options, and shall have more opportunity to ensure that, from the outset, we are kept in the development loop.

Example 2

At Northampton, we have for the past four years been monitoring uptake and feedback from CAIeRO participants and over that time we have made a number of adaptations to the original Carpe Diem workshop format. These are partly in response to continuing evaluation and feedback and partly to align the process more closely with institutional drivers, including the curriculum change project and our commitment to supporting staff to achieve professional accreditation through the Higher Education Academy (HEA). At UoN, we see CAIeRO as having two outputs: a design for the module or programme and skills development for the teaching team.

In response to the diverse levels of experience among our teaching staff, we have discarded the original Carpe Diem requirement that learning outcomes must be finalised in advance of the workshop (Salmon and Wright, 2014). Some of our staff have little experience of writing effective learning outcomes, and getting these right is fundamental to the ensuing design, so we took the decision to address these, if necessary, within the workshop itself, before progressing to align the assessment and the learning and teaching activity. We also designed some independent learning activities directly into the CAIeRO planner[6], for staff who want to find out more in their own time about outcomes, assessment and the design of learning and teaching activities.

Staff and facilitator feedback revealed that different course teams had different needs and, as a result of this, we use the pre-CAIeRO diagnostic[7] to determine the agenda for the workshop. Rather than following all of the steps in every workshop, we consider them more

[6] http://bit.ly/CAIeRO-planner
[7] http://blogs.northampton.ac.uk/learntech/2014/12/24/de-mystifying-the-caiero-the-pre-caiero-meeting/

as a toolkit: we work with the course team to identify which steps need to be covered in detail and customise the workshop plan accordingly. This increases ownership of the process and helps staff to feel it is a constructive use of time. Of course, it also helps if the tailored agenda means that we don't need to take up two full days, which can be difficult for teaching teams to set aside; however, if we do need two days (or sometimes more), the custom agenda makes it clear that it is needs-based.

Linked to this idea of tailoring, for some CAIeROs we have moved away from the emphasis on e-tivities. Our active blended learning agenda presents different challenges for different staff, depending on their experience and confidence with teaching and technology. Where a member of staff is finding it more challenging to design active-learning activities for the classroom, we might leave aside the VLE and help them plan out their face-to-face activity instead – and then, often, the right tools to support this, as well as the work that needs to happen before and after it, become obvious.

Feedback from participants has always emphasised the value of collaboration in CAIeROs. So, in addition to the course team workshops, we also offer 'CAIeRO for Individuals' workshops, for staff who can't get together with their team but still want to be able to work on their own modules. This approach has some disadvantages, in that the structure of the workshop can't be customised and it doesn't address alignment between modules on the same programme, but it also has advantages: the collaborative element is maintained by bringing individuals from different teams together and, through discussion, they often find parallels in teaching practice that are independent of discipline and context.

Further to support the staff development aspect of CAIeRO, we have also included specific reflection points in the process. The planner provides prompts to reflect before the session on available student and external examiner feedback and there are now steps, in the workshop itself, where staff are encouraged to document both their learning and the rationale for any changes they have decided to make. This is intended to help staff recognise the development of transferable skills and also provides both notes towards personal development-planning and evidence for fellowship applications and quality processes.

Conclusions

Carpe Diem is a proven, flexible and engaging method for developing both blended and fully-online courses at university level. As the two examples have illustrated, a level of customisation and contextualisation is necessary to ensure that the model accommodates individual institutional priorities. This naturally restricts the direct comparisons that can be drawn between the two approaches, as well as the possibilities for collaborative evaluation. However, in bringing these two examples together, we have also found some common benefits and challenges in implementing variations of Carpe Diem and we draw these out here, for the consideration of those planning to implement similar approaches.

Release of staff time to engage with the process has proved a challenge for both institutions. Whilst the authors acknowledge that the rationale for the original two-day model is sound, they have found it challenging to replicate in their current contexts. Having high-level institutional support for the process and integrating it into wider review processes can be helpful, although these are by no means a cure-all, as the responsibility for meaningful

participation will always lie with the individual staff member. Our experiences have also shown that the majority of staff engage positively with the workshop element, but it can be challenging to maintain development momentum after the event. Use of collaborative online tools such as Trello can alleviate this somewhat, though schedules sometimes dictate that staff have to leave significant chunks of time between a workshop and actual activity development. These are issues that both institutions are looking to address in the future.

Carpe Diem can also be a powerful way of introducing the concepts of open educational resources (OERs) and open educational practice (OEP) (Armellini and Nie, 2013). At GCU, by embedding the concept of open education within the Carpe Diem process, we encourage colleagues to consider OERs and OEPs as an integral part of their own teaching practice. At UoN, we have integrated a number of additional design-related OERS into the CAIeRO toolkit. Both institutions have continued the open ethos of the early Carpe Diem planner, which was originally released under a Creative Commons (CC) licence, by publishing our supporting resources, using CC licences both for GCU resources[8] and for UoN[9], and by supporting other institutions in turn to adapt and implement their own versions of the Carpe Diem method. As an example, the ELDeR learning design process at The University of Edinburgh was adapted in turn from the CAIeRO process at Northampton (University of Edinburgh, 2017) and it is in the spirit of this continuing conversation and collaborative iteration process that we offer these reflections on our experiences.

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[9] http://bit.ly/CAIeRO-planner

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A critical assessment of the NMC Horizon reports project

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Introduction

In February 2017, the New Media Consortium (NMC) published its fourteenth Horizon Report. Horizon Reports are the result of discussion and evaluation, by a panel of experts, of current trends in educational technologies. Based on their survey of the Educational Technology landscape, they predict which technologies are likely to become of value and/or established in the Higher Education sector over the next five years. These reports are popular among the learning technology community: many bloggers summarise the main findings year on year; they are cited in academic literature; they are used as benchmarks and evidential support to learning technology projects. They have become a mainstay resource and influence Educational Technology purchasing decisions – and, by implication, one might expect them to have influence on pedagogical ideas. For that reason, it is important that they come under some academic scrutiny, but there is surprisingly little critical engagement with them in academic literature. It is my intention to contribute to that engagement in some small way by critically examining these reports on three connected issues:

1. The issue of their influence on the educational technology community;
2. The issue of their forecasting practice;
3. The issue of their ideology.

The NMC claims that its reports are being downloaded in their millions, but the reports' actual influence may not be as wide-reaching as all that, because one might argue that downloading does not equal reading, and that reading does not equal agreement. If therefore the Horizon reports have relatively little influence on educational ideas, and on purchasing decisions, one might understand the lack of critical academic engagement with them. If the reports do have considerable reach however, then it is important that we do examine them critically, both about their nature, i.e. what they are, and about their intended purpose, i.e. what they are for.

In the first part, I will therefore look at the purported importance and possible influence the Horizon Project has or has had in the first place.

Secondly, Horizon Reports make predictions about the future. It is for that reason that the issue of their influence on the educational technology community matters. If they merely charted the Educational Technology landscape – to give practitioners a broad, perhaps global, context for their field – one might trust their 'objectivity', as long as their methodology were sound and open. However, if the Horizon Reports' major selling point is that they make predictions about the future, then the way that they are used by practitioners, and the way their predictions influence decision making, take on a further significance. I will, therefore, in

the second part, explore to what extent their forecasting practice matters, especially with regard to accuracy.

Finally, forecasts aren't neutral observations, but rather the results of interpretations, which are ultimately based on subjective choices, and forecasts may have a strong underlying ideological bias. While we can accept that neutrally observed, descriptive, or 'factual' reports are used to make decisions on investments in Information Technology or Educational Technology, subjective forecasts – and I repeat my suggestion that forecasts are necessarily subjective – ought to be scrutinised more carefully. We should therefore set out to determine whether the NMC has any allegiances or dependencies and whether the reports subscribe to any particular ideology. Uncovering any such bias does not render the reports untenable or obsolete, but it should be part of good practice to make such bias explicit where it is implicit. In consequence, in the third part, I shall uncover some of the implicit bias inherent in those reports.

I shall begin by giving a short exposition of what the Horizon Reports are.

Horizon Reports and the NMC: background

Horizon Reports have been published since 2004. They are part of a continuing 'Horizon Project', initiated and run by the NMC, itself conceived in 1993 in order to bring together *"a group of hardware manufacturers, software developers, and publishers who realised that the ultimate success of their multimedia-capable products depended upon their widespread acceptance by the higher education community in a way that had never been achieved before."* (New Media Consortium 2017c).

The Horizon Reports set out to help educational 'thought leaders' make decisions about which types of educational technologies to pay attention to, which of them to use and in which systems to invest. They make forecasts about technologies that they suggest will have an impact on the global education sector.

According to the authors, the *nature* of their project is to *"chart the landscape of emerging technologies for teaching, learning, and creative inquiry"* (Johnson et al. 2011; Johnson et al. 2012; Johnson et al. 2013); they added, in 2015, that *"with more than 13 years of research and publications, [the Horizon project] can be regarded as the world's longest-running exploration of emerging technology trends and uptake in education."* (Johnson et al. 2015, p.1) The *ultimate aim* of all these publications, whether taken as a whole or taken individually is *"to help educators and thought leaders across the world build upon the innovation happening at their institutions by providing them with expert research and analysis"* (New Media Consortium 2017c). The NMC says that its research *"uniquely provides a cross-sector view of disruptors in higher education, K-12, academic & research libraries, and museums"* (New Media Consortium 2017b)

The reports are produced by means of a transparent iterative research method, a modified Delphi process, refined over the years. They are written by a large panel of experts, and "in any given year, a third of panel members [of experts] are new, ensuring a flow of fresh perspectives each year." (New Media Consortium 2017b) For every report, the evidence collection and discussions are openly accessible on a corresponding Horizon Report wiki.

The issue of influence and impact of Horizon Reports on the Educational Technology community

The NMC Horizon Project prides itself – justifiably – on its openness of research, but it is not so easy to learn about its reach from its website. Thankfully, I received some email clarification from the NMC's former Senior Director of Publications and Communications, Samantha Becker[10]. She declared that there have been at least three million downloads in 195 countries of reports in their HE series from 2014-2017. Numbers are available only from 2014, when a data analytics' infrastructure was introduced. On an annual basis, sum downloads of all the reports since 2014 are between one and two million. The top five countries for downloads in the six months leading up to May 2017 – the time of my email exchange with Ms Becker – were, in descending order, the US, Australia, UK, China and Canada. Bearing in mind that downloading doesn't equal reading and that reading doesn't equal agreement, one might, on the basis of these numbers, justifiably assume that the reports have garnered a status of some global popularity. When further looking at citation numbers, one might also assume that they have garnered a status of some authority: for example, a Google Scholar search sets the citation number for the 2015 Higher Education edition of the Horizon Report alone at 807.

To determine how the reports were used in the literature, I sampled about forty articles from a pool of fifty-six articles in the British Journal of Educational Technology that contained references to any Horizon Reports from 2004-2017. It was apparent from my sample that the reports are on the whole used instrumentally, i.e. as trusted neutral instruments: as reference works, and/or as benchmarks against which the technology uptake of a country / a sector / an institution is measured, and as structural support and/or justification for embarking on specific learning technology research projects. For example, one article begins:

> *"As **revealed** by the recent Horizon Report (Johnson, Smith, Willis, Levine & Haywood, 2011), the creation of gesture-based interfaces (e.g., Microsoft Kinect, Nintendo Wii and Apple iPhone/iPad) create promising opportunities for educators to offer students easier and more intuitive ways to interact with the content in multimedia learning environments than ever before."* (Chang et al. 2013, my emphasis);

Another article uses the same report in the same context:

> *"In short, all these studies suggest that gestures enhance learning. **In support of this assertion,** the Horizon Report (Johnson, Smith, Willis, Levine & Haywood, 2011) identified gesture-based computing as an emerging technology that has a great potential to influence education in the near future by providing a novel form of interaction, expression and activity"* (Ozcelik and Sengul, 2012; my emphasis).

The reports are thus treated as expert data, or objective reference works:

[10] In December 2017, it was announced, to general surprise, that the NMC had ceased operations. This was after a first draft of this article had been sent off. The NMC website has not been updated since NMC cessation of operations. For the purposes of this article this does not matter, as it deals with the Horizon reports up to February 2017. It is nevertheless a surprising and sad turn of events, not least for the NMC staff.

> *"The NMC Horizon Report (Johnson, Adams, & Cummins, 2012)* ***identified*** *mobile apps, smartphones and tablet computers as trending tools for active learning in classrooms with a time-to-adoption horizon of one year or less."* (Van Daele et al. 2017, my emphasis)

and

> *"Indeed social media has been seen as a major driver for change in higher education in the 2014 New Media Consortium Horizons report (NMC, 2014) and improvement of digital literacy skills* ***has been reported*** *as a major challenge in the 2015 report (NMC, 2015)."* (Purvis, Rodger and Beckingham, 2016; my emphasis)

These are representative of the type of engagement the Horizon reports meet with in the literature: relied on as supporting evidence, yes; questioned and analysed critically, no. One article that engages explicitly with the Horizon Reports in terms of their forecasting accuracy is *New technology trends in education: Seven years of forecasts and convergence* (Martin et al. 2011) It contains a bibliometric analysis of the predictions and concludes that the reports are well suited for *"meta-trends analysis of technologies likely to impact education."* (Martin et al. 2011, p.1905). The authors focus on the success or failure of Horizon Report forecasts, but they do not discuss the desirability of such forecasting. Nor do they discuss the impact that the reports have in promoting some technologies over others, or the bias that this implies and promotes. I have given here only a snapshot of the literature, but the snapshot is representative of the academic treatment the reports have received so far. Most of the sampled papers and books cite the reports, but do not discuss them. This suggests that they are viewed as trustworthy *neutral* sources of impartial information.

So far, I have established that the Horizon Reports feature heavily in the literature as neutral reference works, but this does not in itself mean that they also influence 'thought leaders' directly. Yet, owing to their popularity and the singular uniqueness of the project, it is likely that they do. And it does mean that academics in the learning technology discipline regard them, and rely on them, uncritically, which makes it unlikely that policy makers view them any more critically. I conducted a short opinion survey to see if the Horizon Report is as prominent in real life as it is in the literature. The sample is not representative, but offers a larger anecdotal basis for determining how the reports are received and used in the community of Educational Technology practitioners (and 'thought leaders'). The survey was sent to various email network lists of learning technologists, heads of eLearning and HE sector IT departments, from which participants self-selected. Eighty-one respondents participated. Thirteen participants stated unfamiliarity with the Horizon Report, which ended the survey for them. Three respondents did not answer any questions after having stated familiarity with the Horizon Report. One respondent did not answer any further questions after stating that they did not read them as a priority. This left sixty-four respondents who answered the majority of the survey questions.

The purpose of the survey was to inquire into three related areas, a) how participants read the Horizon Reports and b) how participants thought the Horizon Reports influenced their understanding of the Educational Technology landscape and c) how, if at all, they felt that their own views were represented in the Horizon reports.

The following short summary is for the sixty-four respondents who answered the majority of the survey.

Asked to classify how regularly the respondents read the reports,

- Forty-one read them regularly, seventeen read them occasionally when they remember it, five do not think of them as a priority and one person chose “other”, qualifying their answer with “It is on my radar, and sometimes I look at it to remind myself how typically annoying such reports are”.

Asked to classify how much they read the reports

- Thirty-three chose the statement “Executively: I read the summary and some of the predicted technologies”, twenty-two chose the statement “Fully: I read as much of the report as I can”, eight chose “Concisely: I skim the headline predictions in the content table” and one chose “By proxy: I read/ hear about it elsewhere”.

Asked to choose reasons for reading the reports, respondents chose as follows (this question allowed for multiple answers):

- Fifty-six respondents chose “Horizon scanning” as a reason, forty-three chose ‘it is directly relevant to my job’, twenty-nine agreed that it provides them with a global baselined, and twenty-seven agreed that they read the reports to aid them in strategic decisions about educational technology. Nineteen respondents also agreed that the reports had descriptive accuracy for which they read them and sixteen that the reports’ predictive accuracy had value to them.

Asked whether the descriptions and predictions contained in the Horizon report *influenced* their thinking about Educational Technology,

- Thirty-five chose to answer with yes, sixteen were not sure and twelve said that it was not. One person did not answer this question.

Asked whether the descriptions and predictions contained in the Horizon report *influenced* their strategic decisions about adopting particular Educational Technologies,

- Thirty chose to answer with yes, eighteen chose to answer with no, and sixteen were not sure.

Asked if the descriptions and predictions contained in the Horizon report *reflected* how respondents think about educational technology,

- Twenty-five respondents chose to answer with yes, twenty-nine were not sure and ten respondents chose to answer no.

Asked if the descriptions and predictions contained in the Horizon report *reflected* their strategic decision making about educational technology,

- Twenty-seven respondents opted to say they were not sure, twenty-two chose to answer with yes and fourteen respondents chose to answer with no. One person did not answer this question.

In this short poll, respondents were more likely to believe that *their* thinking was influenced *by* the reports than they believed that *their* opinions were reflected *in* the reports. This brings us to a point about the reports' methodological intentions. Horizon Reports are supposedly put together by an expert of panels who listen to the opinions of the sector. The NMC explains that the panel of experts brought together each year for each annual report *"as a whole is intended to represent a wide range of backgrounds, nationalities, and interests, yet each member brings a particularly relevant expertise."* (New Media Consortium 2017a). In the above short survey, respondents were either unsure or did not feel that their views were being taken on board by the Horizon reports. However, my participants were almost exclusively from the UK, whereas the Horizon Project panels tend to be populated by experts from the USA. Any discrepancy might be explained by this difference. Then again, the NMC points to its reports' global reach and global impact, and we should therefore point out that there might be some cultural and geographical bias in them. The USA Higher Education system differs significantly from those of the UK and Europe. UK and/ European readers of the report will need to consider that some of the technologies that are predicted to make an impact within a USA context, and that such predictions are not so easily translatable into their own context.

So far, I have argued that the reports are used extensively as neutral reference works and have received very little critical attention in the literature. Judging from a small sample of UK practitioners we might further suggest that the reports are read strategically, rather than critically, above all for horizon-scanning and because they are directly relevant to their jobs, and that the reports have some influence on their strategic decision making with regards to using technologies for learning. Thus, the reports have established themselves as a trusted source of information and potentially form the basis for financial decision-making in the sector, without having been scrutinised for their methods and processes, their neutrality or even their forecast accuracy. In the next part, I will deal with the matter of their forecasting practice.

The issue of the Horizon Reports' forecasting practice

The Horizon Reports' first aim is to chart *"the landscape of emerging technologies"*, but, based on this, they also make predictions about the future. Commenting on the eighth annual report, Stephen Downes complained: *"in my opinion, the Horizon Report tracks technologies that have become more prevalent in media reports. It is a* ***publicity tracker, not a tech tracker****."* (Downes, 2011; my emphasis). I am not sure that this is entirely fair, because if the panels of experts are to track emerging technologies, they need to have heard about them. The Horizon Report expert panels explicitly track the cultural Educational Technology landscape, naturally technologies which receive most publicity feature most prominently on that landscape. I would suggest that, owing to their popularity, Horizon Reports have become publicity *generators,* adding to the hype and promotion of their selected technologies or technology trends. Predictions by a well-regarded, and (self-proclaimed) unique authoritative source can act as self-fulfilling prophecies. The six technologies that the panel of experts pick each year are not merely predicted to make an impact; rather, by the very fact of their being predicted, they become recommended. Which emerging technology company would not want to be recommended by such an influential publication?

I have asserted that the Horizon Reports have somehow escaped academic scrutiny, but, naturally, they have also attracted critical comments in the past. Most frequently, their methodology is criticised. Stephen Downes' is one such critical voice, because he considers the methodology not to be based on a *"deep knowledge [of] significant technology developments."* (Downes 2015). Audrey Watters has focused her criticism on the lack of historical perspective, stating as one of her *"frustrations with the project: it does not revisit previous year's predictions, and as such does not really explain how or why the trends suddenly appear and disappear and reappear…"* (Watters 2015). But both these criticisms appear merely in short blog posts – and neither of them has a problem with technology predictions as such. I would suggest that a more important issue about forecasting is that it is always liable to bias, because forecast *methods* are subject to bias - sample bias, starting-point bias, ideological bias and so on. Yet these forecasts are often presented as hard evidence, and they are read and used as providing and being exactly that. For example, a judgmental forecasting method like the Delphi method, which relies on the judgement of a large set of experts, needs to be scrutinised for the criteria for assembly of the expert panel.

One of the few properly engaging, critical analyses of the Horizon Reports I have been able to find is *When prophecy fails* by John Baggaley (Baggaley 2013). In his article, he describes with brilliant clarity, and with great force, the negative fallout of inaccurate predictions. He castigates projects such as the Horizon Report and the 'One laptop per child' initiative because of their flawed methodology and their hyperbolic claims of the positive effects of educational technology on, in particular, developing countries.

Baggaley wants us to be aware of the real dangers of applying future-gazing speculations to real-life situations, especially if applying forecasts out of their first-world, privileged context:

> *"Predictions about emerging technologies play a useful role in alerting educators to new possibilities. But the history of the field is littered with uncritical stargazing, and well-designed media are left to rot like dinosaurs on the landscape owing to baseless promises that new media will improve on them. Abandoning technologies that do the job well in favor of unproven ones can set the field and the students back by years."* (Baggaley 2013, p.125).

Baggaley means that the prediction-makers, even if they do not care about their predictions' accuracy, are still responsible for potential negative fall-out. One could argue that each Horizon report is only a snapshot of expert opinion at the time of their conception, and that the NMC makes no claim to have envisaged the project to be a longitudinal analysis. But even if the Horizon report project was not intended as a longitudinal analysis from the outset, the authors accept it as exactly that in the 2015 Higher Education edition, by stating that *"with more than 13 years of research and publications,* [the Horizon Project] *can be regarded as the world's longest-running exploration of emerging technology trends and uptake in education."* (Johnson et al. 2015).

But perhaps it does not matter whether forecasts are accurate or not, perhaps what matters more is why forecasts are being made at all. I suggest that we should question the motivation for making such predictions in the first place. Predictive reports are, in some way, always about the present. Like science fiction, they do not deal with the future, which is in any case impossible, but they reveal the now. What matters is that the now *creates* the future. For this reason, John Baggaley raises the point that predictions can be irresponsible.

Predictions made by an authoritative source can cause investors to ignore present solutions because they are always waiting for the future.

For this reason, we must focus our attention not on when and how the reports have 'failed' in their crystal-gazing: I want to bring us back to asking *why* they might engage in this crystal-gazing in the first place. What benefit is there to making such predictions? Further, *who* benefits from such predictions? Above, I have already intimated that the Horizon reports garner publicity for the technologies they discuss and, in some way, recommend. In a private email, Samantha Becker, the NMC Senior Director of Communications (who was then also the Director of the Horizon Project) wrote to me that *"Once we release a report, I like to say 'it belongs to the people.' Any conversations it incites, positive or negative, is a beautiful thing because it's getting people talking and questioning about pressing issues in education."* This is a generous sentiment and she further elucidates: *"we strive for the reports to be completely neutral and unbiased. The NMC staff never selects the topics — an outside expert panel does upon months of discussion and voting."* This is undoubtedly true, but it is not the whole truth. Baggaley observes that access to the panel is provided by membership to the NMC, and corporate members include Adobe, Apple, Pearson, corporations for whom the education sector is a significant market. Thus, at least some people on the editorial board have vested financial interests in technologies being used in Higher Education. In that context, the composition of the panel matters, and so does the chosen method. The Delphi process is designed for the building of consensus – a wonderful thing, unless it means that it methodically irons out fringe views, where such fringe views might be determined by one's nationality. For example, a German academic working and reading in a German Higher Education context, will necessarily be at the fringes of a panel whose middle ground is populated by Americans. By that same reckoning, an academic might find herself or himself at the fringes in a panel dominated by corporate types. And here we might return to what we know about the origins of the NMC, namely that it was explicitly put together so that a group of technology corporations could open the Higher Education sector to their products. In other words, the NMC's *raison d'être* is to "sell us stuff".

The issue of the underlying ideology of the Horizon Reports

The group consisted of Apple Computer, Adobe Systems, Macromedia, and Sony, companies still well-known, though perhaps not primarily for their philanthropic endeavours. I cannot here enter a discussion about whether or not private for-profit companies can have benign or educationally-beneficial motives. I can say that the NMC subscribes to a positive technological instrumentalism, that is, its implicit assumption is that technology is always better, that it is always progressive and that it has intrinsic positive value. That is a perfectly legitimate position to hold, albeit not a particularly differentiated one. It is tenable, however, and allows for the possibility that the consortium's motivation for making its products useful to the education sector is not merely profit-motivated. Thus, whilst the consortium members banded together the better to sell their products to the Higher Education sector, it might *also* have benefited that sector. And so, though we might be suspicious of the origins of the NMC, we do not need to conclude that their research is deliberately biased. We do need to be vigilant. At least their data is open, and so they are justified to claim in their Research and Publication Standards:

> *"We are committed to contributing to the body of knowledge that informs practice and drives innovation through conducting independent research and publishing unbiased reports and other resources …"* (New Media Consortium 2017d)

We can be generous and grant them their commitment to research that is neutral, objective, and agenda-free. We don't have to take for granted that they succeed. As for their independence, I would suggest that my earlier point – that NMC membership guarantees access to the expert panel – puts this into doubt. There are also other ways in which bias shows. For example, I mentioned that the NMC clearly subscribes to a positive and instrumental view of technology. Such a view expresses an ideology and it gives rise to *ideological bias*, of which there are plenty of implicit instances. Thus, in the 2014 report, the authors state that because *"students expect to graduate into gainful employment, [i]nstitutions have a responsibility to deliver deeper, active learning experiences and skills-based training that integrate technology in meaningful ways."* (Johnson et al. 2014) This implies that, for the authors, the responsibility of universities is to deliver students ready for the labour market. It begs the question 'What are universities for?' quite clearly: universities are places of vocational training. However, that is not the only answer and it is not everybody's answer; it is an answer specific to a specific educational viewpoint – an ideology. In the 2017 report, the theme of 'spurring innovation' is introduced by this clause: *"if education is viewed as a vehicle for advancing the global economy..."*. This too, begs the question of what education is for, this time implying that it is to advance the global economy. It is possible to find such hidden unchallenged assumptions throughout the reports from 2004 till now and I will add two further examples. In the 2009 report, the executive summary states that *"Higher education is facing a growing expectation to deliver services, content and media to mobile and personal devices."* and *"The renewed emphasis on collaborative learning is pushing the educational community to develop new forms of interaction and assessment."* (Johnson et al. 2009).

It does not matter if these are statements that one agrees with, or that they reflect an agreeable or disagreeable idea. What matters is that both statements carry hidden assumptions that are not 'neutral'. The first quotation implies that, when there is a growing expectation to deliver a service, the answer must be to fulfil the expectation, rather than to question it. That, however, is not always the best or only option available. It is not the only answer and it is not everybody's answer. The second quotation implies that collaborative learning is educationally valuable. This too can and should be questioned. Maybe it is, and maybe it isn't. I would suggest that at least it is not exclusively so: in Higher Education, solitary learning is also important, useful and encouraged, but we find no mention of this in the reports. It just so happens that the technological trend is towards social working, collaboration, networking. One might wonder to what extent we have 'renewed emphasis' on collaborative learning because of the explosion of social media over the last decade, rather than because demonstrable improvements in learning drive the development of social tools. One might also wonder to what degree that is down to bands of commercial enterprises such as the New Media Consortium. Above all, it matters that within the context of the Horizon Report these are 'factually reported' but not critically discussed. It matters, because it is rightfully academic that we approach these and many other assumptions critically and ask critical questions. We understand now that the NMC's answer to any of our educational challenges is to utilise technology to meet them. Disagreeing with such technological determinism does not necessarily force us to shun the outcomes of the reports. The

suggestions made by the reports can remain useful to us, but we should approach them critically. That, I would suggest, would be to our students' and our own advantage; it would be to the advantage of learning, teaching and research, rather than to the advantage of the companies who initiated, more than twenty years ago, a consortium that has as its explicit aim the embedding of *its* technologies into *our* sector.

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One size doesn't fit all: rethinking approaches to continuing professional development in technology enhanced learning

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Introduction

In a prescient book, Tony Bates (2000) stated that students would reject universities which refused – or were unable – to integrate technology into teaching and learning. To fail to integrate it has long been unthinkable; its deployment has been unavoidable (Donnelly and O'Rourke, 2007). However, the pace of change, the embedding of technology and the approaches taken have not been as swift or successful as many would have hoped. Analyses of data from National Student Surveys (NSS) suggest that the negative views of students about assessment and feedback might be accounted for by failure to exploit the potential of technology (Cook and Jenkins, 2010). More recently, whilst 80% of Higher Education (HE) students reported reliance on their Virtual Learning Environment (VLE), only 40.8% said that they enjoyed VLEs' collaborative features and only half stated that their programmes of study were preparing them adequately for digital workplaces (Newman and Beetham, 2017).

There is no doubt that Higher Education Providers (HEPs) have invested in technological infrastructure for teaching and learning, as well as in what must often seem like an army of learning technologists to support and promote the use of various learning platforms. Some of the systems' licences cost tens of thousands pounds per annum. VLEs are now commonplace in UK HEPs and their use by lecturers is increasingly prescribed. Furthermore, the vast majority of Institutions have deployed IT solutions for the electronic management of assessment (EMA) which includes online submission and online marking. Lately, lecture capture systems have become increasingly popular as well (Walker *et al*., 2016). Whilst the above centrally-deployed systems have been used by many staff, they are often used for their administrative benefits rather than to transform teaching and learning. For instance, in the majority of cases, the VLE has been used largely as a content repository and EMA practices have been implemented for their administrative benefits and for convenience, as they allow students to submit their work (and tutors to mark it) from anywhere in the world.

Many HEPs are aware of the potential growth of online, distance (and often shorter) courses and programmes using such approaches as Massive Open Online Courses (MOOCs) and/or strategies that seek to push mobile learning and 'Bring your own device' (BYOD). However, Paul Feldman, Chief Executive of Jisc (cited in Newman and Beetham, 2017, p.5), says that *"some providers still need to do more to get the basics right – including guaranteeing decent wifi provision across campuses and continuing access to desktop computers"*. Within this evolving and often discordant technology enhanced learning (TEL) landscape, one aspect that is also fraught with difficulty is the way new technologies and technological initiatives are deployed and supported, especially in terms of continuous professional development (CPD) for staff with lecturing or other student-facing roles. Institutional technology is often

introduced to lecturers with standardised, one-size-fits-all training sessions which focus on the technological functions rather than pedagogy (see Figure 1 below). In our current roles as educational developers, both authors have lecturer education responsibilities which include the use, promotion, modelling and support of technologies for teaching, learning and assessment. Our previous work in teacher education and learning technology, and with a range of post-1992 HEPs, suggests that this is a sector-wide need. This experience has given us both the opportunity to see evidence of missed opportunities, misalignment of technology with training, a disconnect between the technological tools and pedagogy and the persistence of forms of the didactic, tool-focused training that is more transmissive than transformative. One consequence is that it fails to engender the hoped-for spike in the use of such tools, let alone innovative and creative uses of them. Despite its ability to improve the quality of teaching and learning and, in our NSS-sensitive world, such essentials as rapidity of feedback, there remains an apparent reluctance to change established academic practices at the anticipated/desired rate, to the intended scale or by the type of technology used.

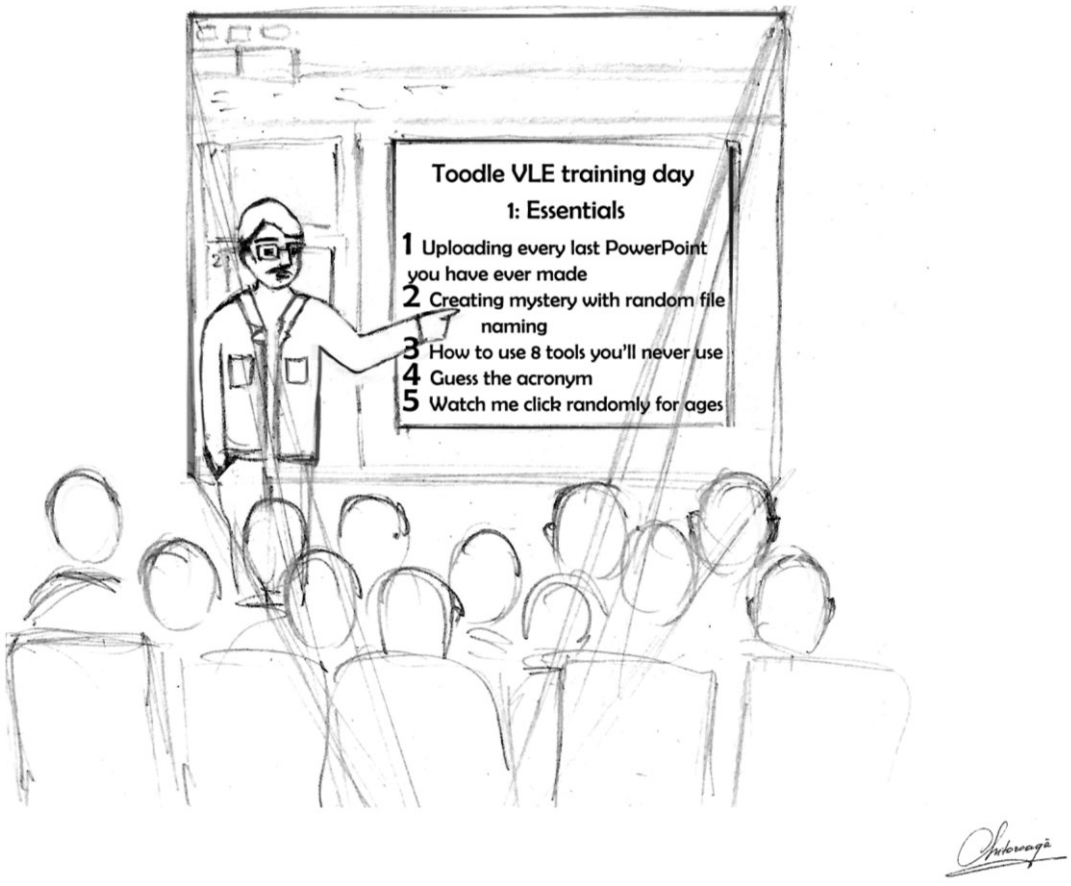

Figure 1: One size fits all: a training day horror

We have discovered that we have sought to tackle this in similar ways. We both favour the use of cloud-based educational and productivity applications (or 'apps') where there is an identified need – for lecturer or student – or where existing tools (for example, the

collaborative tools in VLEs that the majority of students do not enjoy) are too clunky, unintuitive or inadequate. We also favour a re-focus – away from the 'tool' – which instead places purpose and pedagogy at the focal point. An example of this would be sessions where colleagues are invited to consider the concept of the 'advance organiser' and are first shown a range of technological approaches to creating advance organisers. They then choose one they feel may best suit their cohorts, their needs and their technological 'comfort zone' and produce an 'artefact' that can be trialled with their students. Step-by-step training, how-to guides and at-the-elbow 'click here, click there' training are replaced by choice, discovery, collaboration and available support if required. On the formal training programmes that we offer academics, we model a selection of tools as exemplars and present them as options for completion of individual or collaborative assessments. We make frequent use of such methods as screencasts, podcasts, interactive video content and curated material; participants often ask us about these and how they might apply them in their own contexts. By these means, we are suggesting and providing alternative approaches to using technology for teaching and learning that are needs-focused, more likely to be individualised and helpful for recognising and addressing some recurring problems. This contrasts with the standardised training characterised in Figure 2 below. Integrating relatively easy-to-use 'quick win' apps into the VLE increases interest in using them to enhance the look, feel and effectiveness of the courses on the VLE. In this paper, we detail some of the problems and rationalise further the approach we take, arguing that we are more likely to effect change in technology-use culture if we eschew as default the one-size-fits-all approach, with its emphasis on institution-wide systems and compliance.

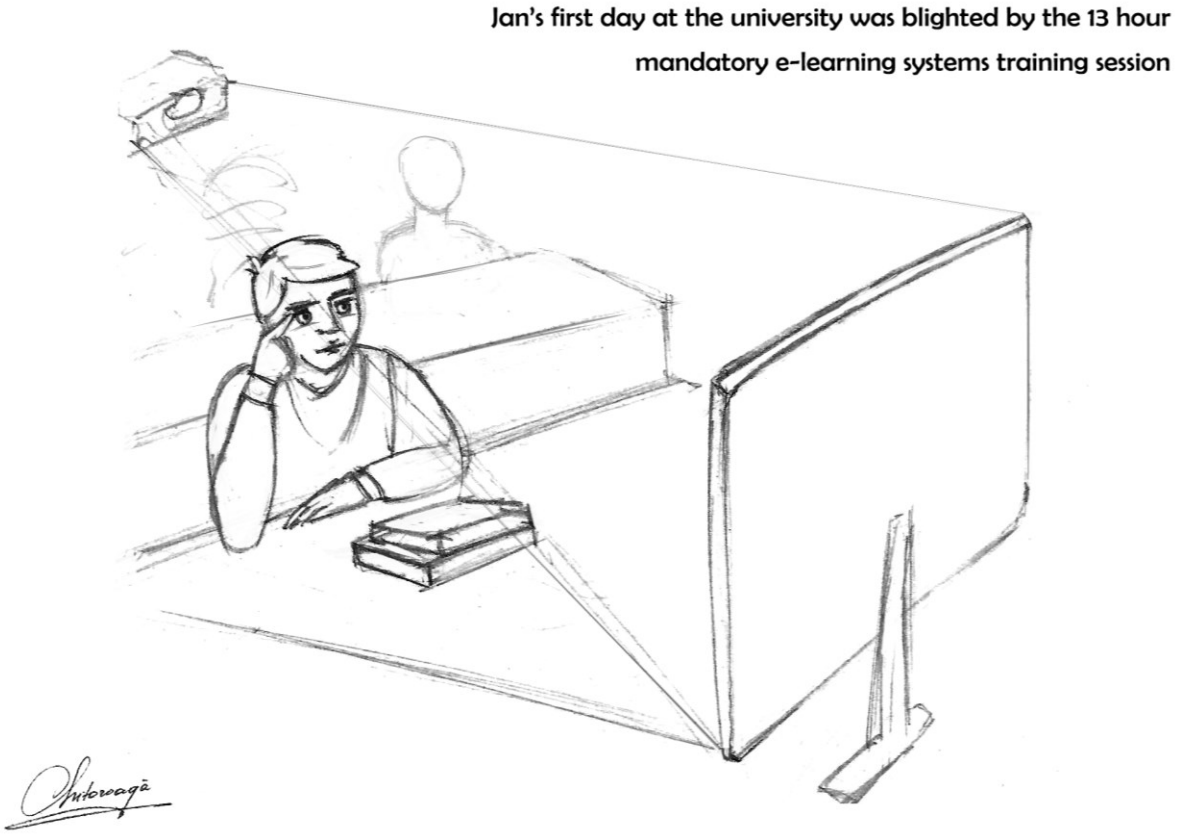

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Figure 2: The thrill of the mandatory e-learning training

We also argue that, to challenge the apparent reluctance to embed technology, there is potential in rethinking the strategic approach to the tools used and the ways they are introduced and supported. We suggest that free or freemium[11] cloud-based tools and mobile apps have the potential to engage lecturers and thereby enhance teaching, learning and assessment; they would complement, and encourage use of, the established institutional learning technology platforms.

Resistance and barriers

Given the impetus for integrating technology into learning, teaching and assessment, the internal and external drivers of it and the degree of investment in it, why do most of us not work in technology utopias, surrounded by adept lecturers comfortably using a range of bespoke productivity tools to enhance that teaching, learning and assessment in dynamic, fluid and innovative ways? A cynical view might be that academics are notoriously conservative and have to be dragged, kicking and screaming, into the digital age; indeed, when it comes to the use of learning technologies in HE, staff reluctance and resistance reportedly constitute one of the main barriers to the widespread adoption of TEL by teaching staff (Almpanis, 2015a). Yet there are logical and reasoned arguments that might better explain this reluctance, inability or scepticism. In relation to elementary education (though the arguments have resonance at the other levels of education), Rowan (2014) cites fears about medical and emotional dangers, 'detachment from humanity', dubious cost benefits, neglect of 'basics' and 'unproven benefit'. This continuing debate *"is compounded by the fact that there is very little reliable, original pedagogic research and evaluation evidence"* (Anderson, 2007, p. 32) – a fact that, ten years on, is often an argument for resistance.

According to Rogers' (2003) 'Diffusion of Innovations' model, new ideas, if they are to spread, need communication channels, time and a social system. In this process, just a few people are the innovators, followed initially by the early adopters. Next, the early majority adopts the innovation, followed by the late majority. Finally, there are the 'laggards', who fall behind, either because the innovation is passing them by or because they are reluctant to change.

When it comes to the use of technology in education, reasons behind this 'laggardliness' include pressures on staff time, lack of digital skills and, more importantly in the context of our argument, lack of pedagogical understanding of the ways technology can be used as part of a different teaching approach (Almpanis, 2015a). Time and financial costs – in set-up, maintenance and encouraging participation (Hughes and Kidd, not dated) – are common barriers, both individually and institutionally. Lack of appropriate resources (Attwell and Hughes, 2010) and the (physical and virtual) location of those resources (Romiszowski, 2004; Daly, Pachler and Pelletier, 2009; Attwell and Hughes, 2010) have also been frequently-reported impediments, as, too, have reliability of equipment and time commitments (Butler and Sellborn, 2009). Romiszowski (2004) argues that it is not the technology itself, but the lack of both institutional understanding and of training that lead to failure. Our own experiences do seem also to confirm that current HE budget constraints are a major impediment to completely comprehensive staff acceptance of – and capability to apply – technological strategies in learning and teaching.

[11] Freemium: a business model where basic services are free of charge while more advanced features must be paid for.

An extensive literature review (Atwell and Hughes, 2010) on pedagogic approaches to using technology in the classroom makes it clear that pedagogic benefits still outweigh the issues cited above *if approach, training and investment support their use*. Those infrastructural and policy impediments are largely beyond our direct sphere of influence, but CPD, from one-off sessions to full lecturer-development programmes, is central to our roles in the Educational Development Unit. Our roles require us to deploy technology and model pedagogically its effective use. Through personal and professional interests, we are exposed to a range of approaches and tools that sit outside such institutional systems as the VLE.

The following section looks at how CPD in the application of learning technologies can form the basis for positive changes and new directions.

CPD in the use of learning technologies

One of the most fundamental issues in much of the dominant HEP CPD in the use of learning technologies is the disconnect between pedagogy and technology. This is a frequent refrain in the two most comprehensive educational technology reviews (Daly, Pachler and Pelletier, 2009; Attwell and Hughes, 2010), where acknowledgement of the apparently impressive extent of technology-based training is counterpointed with the observation that too much of it is skills-focused and fails to address pedagogy, let alone subject specificity or teacher dispositions. Attwell and Hughes (2010) argued that, considering the emphasis placed on improving integration of technology and education, there was *"a surprising lack of research on the impact, organisation effectiveness and still less the pedagogy of such professional development"* (*ibid*., p.5). Whilst this has been addressed to an extent in the last few years, it is still far from being comprehensive, consensual or compelling.

The academic evidence and the continuing problems hint at the solutions, however. The issues above suggest that part of the solution might be technology that is easier to use, is cheap and/or free and, above all, saves time or has quick and easy tools (Bitner and Bitner, 2002). Other solutions suggested by the deficits identified could be to: give 'ownership' and make access flexible (Bradshaw *et al*., 2012; Beetham and Sharpe, 2007); evaluate, trial, show value to engage teachers' interest (Butler and Sellborn, 2002); change entrenched attitudes and beliefs (Hew and Brush, 2007; Guskey, 2002). We share Guskey's (2002*)* view that teacher behaviours will change only if teacher beliefs are challenged.

In terms of the actual process of CPD, there is a need to have agreed content, ownership of CPD materials and a culture-shift away from teachers having CPD 'done' to them (Bradshaw *et al*., 2012). Nevertheless, there remains value discord in relation to types of CPD: transformative CPD, which rates informal and collaborative learning highly, is *not* favoured by key policy-making and managerial stakeholders (Kennedy, 2011).

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Figure 3: The do-what-I-do e-learning training model

Embracing the changing role of teachers and providing carefully-planned CPD are essential for effective use of technology in and beyond classrooms (Ackerman and Krupp, 2012; Almpanis 2015b). Multiple models for the implementation of educational technology are needed, as well as innovative approaches to curriculum delivery (Oblinger, 2012). Putting teachers at the heart of technology implementation, in lieu of the tendency towards technology-driven approaches to CPD, is also crucial (Hennessy *et al.,* 2005). The inadequacies of a one-size-fits-all training approach (see Figure 3 above), though this appears to remain the predominant model, are mentioned in most of the analytical literature from the last decade or more (Koehler and Mishra, 2009; Attwell and Hughes, 2010).

Ownership, informal learning, relevance and supported links to pedagogy therefore appear fundamental to achieving the changes desired by all the key policy-making stakeholders. An extensive study (Cordingley *et al.,* 2007) of positive outcome and specialist-led CPD in schools, found that there were commonalities in approach similar to those cited above, though the structures and types of interventions were varied.

Effective CPD is as much about the process as the content (Rodriguez *et al.,* 2003) and needs to be dynamic to reflect the rapidly-changing nature of technology itself (Donnelly and

O'Rourke, 2007). Koehler and Mishra (2009) argue that that digital technologies are mistakenly considered to be like other technologies used in classrooms, such as whiteboards and pens. However, they are 'protean' (multi-functional), 'unstable' (constantly evolving) and 'opaque' (*ibid.,* p.61) (it's not self-evident how they should be applied) and this means that alternative approaches for teacher development need to be employed.

The changing e-tool landscape – in terms of what tools are available and how innovators are using them for teaching, learning and assessment – will also have impact on sustainable CPD designs. Teachers' already-acquired capabilities in using social media technologies will have an increasing impact on their digital literacy and could be harnessed and focused on pedagogy. A survey, by Ecclesfield *et al.* (2013, p.10), of over 800 FE practitioners led them to conclude that the factors which define effective education technology interventions are: *"good teaching and learning and not uniform use of large centralised technology hosted by the employer" and "training should be aimed at the application of technology"*.

Cloud tools and apps

The use of mainstream, institutional and sometimes inflexible platforms has been criticised by the 'Edupunk' movement, whose members advocate a more do-it-yourself approach to technology, by means of free, cloud-based tools (DeSantis, 2012). Their argument is that institutional systems can be used for management and control and they are not fit for purpose, whereas a combination of freely-available tools allows for more flexibility and freedom of choice, providing opportunities for the online community to remain active beyond the strict duration of a course. This also means that students will become more familiar with technologies they might be using already or will use later on in their professional lives, so acquiring real-world experiences and becoming more digitally literate. This approach, of course, would require academic staff who are not only digitally literate but also willing to explore new possibilities for learning.

Whilst we doubt that most academics feel they are in a position to embrace fully the Edupunk ethos, we feel there is much that is inspiring and potentially beneficial when it comes to the integration of technology. There are countless apps designed for cloud-based use and others that work with tablets and smartphones. Many are designed deliberately for the education market, whereas others are better framed as 'productivity' tools that have applications within, but also beyond, education. We have been using, testing, collecting and disseminating these tools for several years. We have established three broad criteria for their use. They need to meet all three to have any chance of proving a utility to some teaching academics:

Are they cloud-based or mobile apps that are free/freemium? Too often, those with purchasing power are 'wowed' at technology exhibitions or other events and persuaded to buy expensive licences without considering training costs or other implications. If the tool/software also requires a download or individual installation, then this adds additional barriers and costs. Trialling and, hopefully, continuing limited use for cloud-based and mobile apps must be free, freemium or advertisement-supported. This allows for a diversity of tool use, precisely aligned where possible to the specific need.

Are they easy to use? One of the perennial problems with technology is that what is easy to an expert learning technologist may seem unintuitive and very difficult to someone who

does not use technology to the same level. Of course, ‘easiness’ is a supremely subjective concept, but our benchmark is the Microsoft PowerPoint software: for something to be ‘easy’, it needs to have a shallower learning curve than that, and, preferably, significantly so.

Are they fit for purpose? Do they fulfil a need that might otherwise not be met by existing technology or do it better? For instance, most VLEs have quizzing tools, can support video upload and have wiki-type collaboration spaces, but a wide range of tools can do these things with greater ease, providing better functionality and integrating (e.g. through linking or embedding) with VLE platforms.

For example, for our own programmes, we use online curation tools to collect and collate our own as well as web-based content (such as YouTube videos) and then embed these resources in our VLE. We estimate that to organise and upload the same amount of material directly in the VLE would take between three to five times longer. We use collaborative cloud-based presentation software embedded in the VLE to provide a single space for co-created resources. We use cloud-based poll and quiz-authoring tools linked to or embedded in VLE content to encourage interaction and engagement. The authoring of this takes a fraction of the time of the VLE system, is usually more visually appealing and is diverse in format and question-type options. It is sometimes argued that the tracking options are limited, and this may be true with some of the tools we use, but our intention is engagement and formative assessment (as well, of course, in our case, of showing lecturers the range of tools available to them). We also utilise content created with mobile and tablet apps, such as presentation artefacts, animations and interactive media, or create resources that allow for interaction via mobiles and tablets.

The use of these tools has additional benefits. Setting up a student collaboration zone using a VLE tool means that users experience something that has no transferability beyond education settings. VLEs are by definition ‘walled gardens’ and so, though the online collaboration is there, the wider, future use potential is not. Beyond tools used within or alongside the VLE, we have also shifted from a paid, bespoke e-portfolio system to one that exploits free online cloud storage. It also allows our students (who are our colleagues) to see potential in such use of cloud storage and authoring systems, which many have, in turn, applied to their own context. In all these instances we are overtly focusing on teaching and learning, but, in many ways, conducting technological CPD by stealth. The focus on pedagogy on the programme is underpinned at all stages by the tools and approaches used and this provides a springboard for continual requests for one-to-one, departmental and faculty support in using similar tools and approaches. One example has been the success of the ‘30 apps’ session, which encourages colleagues to consider the potential of a range of cloud and mobile apps before choosing one or two for experimentation and application to their discipline and teaching contexts.

When using open tools, it is important to keep in mind that staff and students develop their conceptual digital capabilities alongside the technical in order to meet their pedagogical needs. As traces of usage in such tools as Twitter and blogs will leave a digital footprint for a very long time, lecturers should emphasise the importance of responsible and professional use of such software, enabling students to have a considered approach and preparing them for the workplace.

Conclusions

Institutional systems that support learning still have a place, as they provide a TEL baseline. These systems are modular and integrated to other university systems, such as student records, thus making easy some of the administrative processes in creating an online safe space per course or programme. However, we argue that these spaces can be enhanced and/or spiced up by the use of other cloud-based solutions as and when the lecturer sees fit, on the basis of context and pedagogical needs.

The wide adoption of institutional platforms doesn't necessarily equal effective use. A more blended approach to the tools used might be the way forward. Institutional platforms such as VLEs can still be used as the backbone, but other cloud tools can also be used when they are fitter for purpose.

Whilst training and support for the institutional platforms may continue to be centralised and offered by non-academic staff, knowledge-sharing among educators by means of the pedagogically-effective use of various cloud-based solutions and applications is important too. Our advice is to 'start small, start easy and then build up'. Decision-making in choosing the right tool for each scenario is always required: whilst a discussion forum in the VLE might sometimes look like a safe option for students to express their opinions, a publicly-available blog may provide a more real-world experience to students studying media or journalism, for instance.

We suggest that a blended approach in terms of the tools used in HE is the way forward; the VLE as the learning portal can be the cake but without the icing, cherries and candles: it might be a bit dry and uninspiring! Furthermore, letting lecturers have a little pick at the embellishments may persuade them to try a whole slice voluntarily rather than having it force-fed to them.

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The use of Moodle for Formative Assessment in Mathematics

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Abstract

Mathematics is not an easy subject to assess online. However, Moodle has a useful quiz option which can randomly generate questions. In this article, we will investigate the use of multiple-choice quizzes for formative assessment, and discuss their strengths and weaknesses.

Introduction

Technology has become an increasingly large part of modern pedagogy. The Journal of Technology, Pedagogy and Education illustrates current research (Bennett, 2017), while the paper Summative and Formative Assessments in Mathematics Supporting the Goals of the Common Core Standards in the journal Theory Into Practice (Schoenfeld, 2015) is specific to mathematics. Although this article focusses on mathematics and Moodle, the ideas are transferable to other disciplines and platforms.

Mathematics as a subject does not always lend itself well to technology as much as is reliant on pen and paper approaches. However, opportunities are available to utilise technology to enhance the student experience. Moodle is the preferred platform for many universities, including the University of Greenwich. For some courses, it is used primarily as a storage resource, but it also contains powerful tools for online assessment.

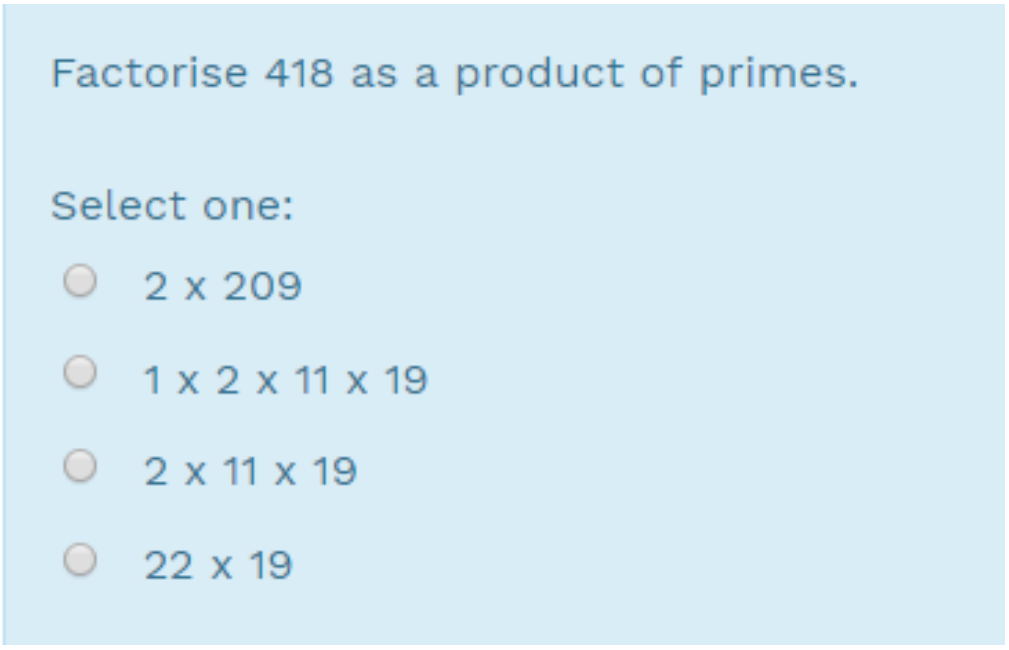
Assessment falls into two broad spectrums – formative and summative. While formative assessment is based upon developing a student's understanding, summative assessment is designed to give the student a grade based on the work s/he submits. This article will focus on the formative aspect – we shall look at how to help a student develop their understanding based upon a series of non-assessed online quizzes using the Moodle platform that they are all familiar with.

Mathematics is difficult to assess online summatively.. small interpretative mistakes – inadvertent rather than of understanding – by the student can lead to a wrong answer and, often, such misrepresentative errors can be detected only by the assessor's visual scrutiny. Only a sophisticated and thorough mathematical engine underpinning the online assessment process could technologically achieve the same degree of precision – small mistakes can lead to the wrong answer and it is therefore often necessary to use the human eye to detect the mistakes, which is something that cannot be done online without a thorough mathematical engine underpinning the assessment. Nevertheless, multiple choice quizzes can help to develop understanding in a formative sense. Moodle provides the opportunity to do this, allowing for variations on questions. In this article we will discuss how to implement such assessments with variety and provide a critique of its suitability both in mathematics and for general subjects.

Moodle quizzes

Moodle has an option to create an online multiple-choice quiz. It was felt that this was most appropriate for formative assessment, as the work involved was prohibitive in scrutinising errors made. Moodle allows for the creation of quizzes derived randomly, both in terms of the order of questions, and the questions themselves.

As an example, running an online quiz twice gave two different questions testing the knowledge of the same concept:



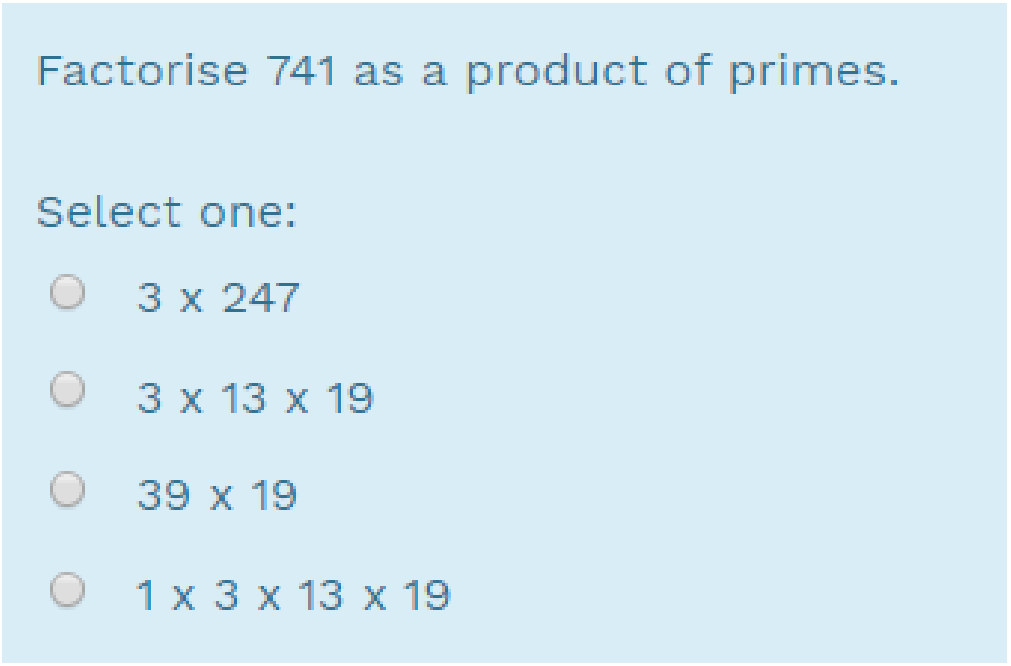


Figure 1: Alternative multiple-choice questions to test the same concept

To perform this randomisation, it is necessary to define variables that are then selected at random; by Moodle. In this particular example, we used the question

Factorise {=({f}+1)*({g}*2+9)*(2*{h}+15)} as a product of primes.

Here, {f}, {g} and {h} represent variables that can be prescribed to be chosen randomly within a given range.

This allows for multiple versions of the same question. The multiple choice options can then be specified, ensuring that one is the correct answer and the other three are variants, including common mistakes that students make – this can be specified in Moodle, such as below:

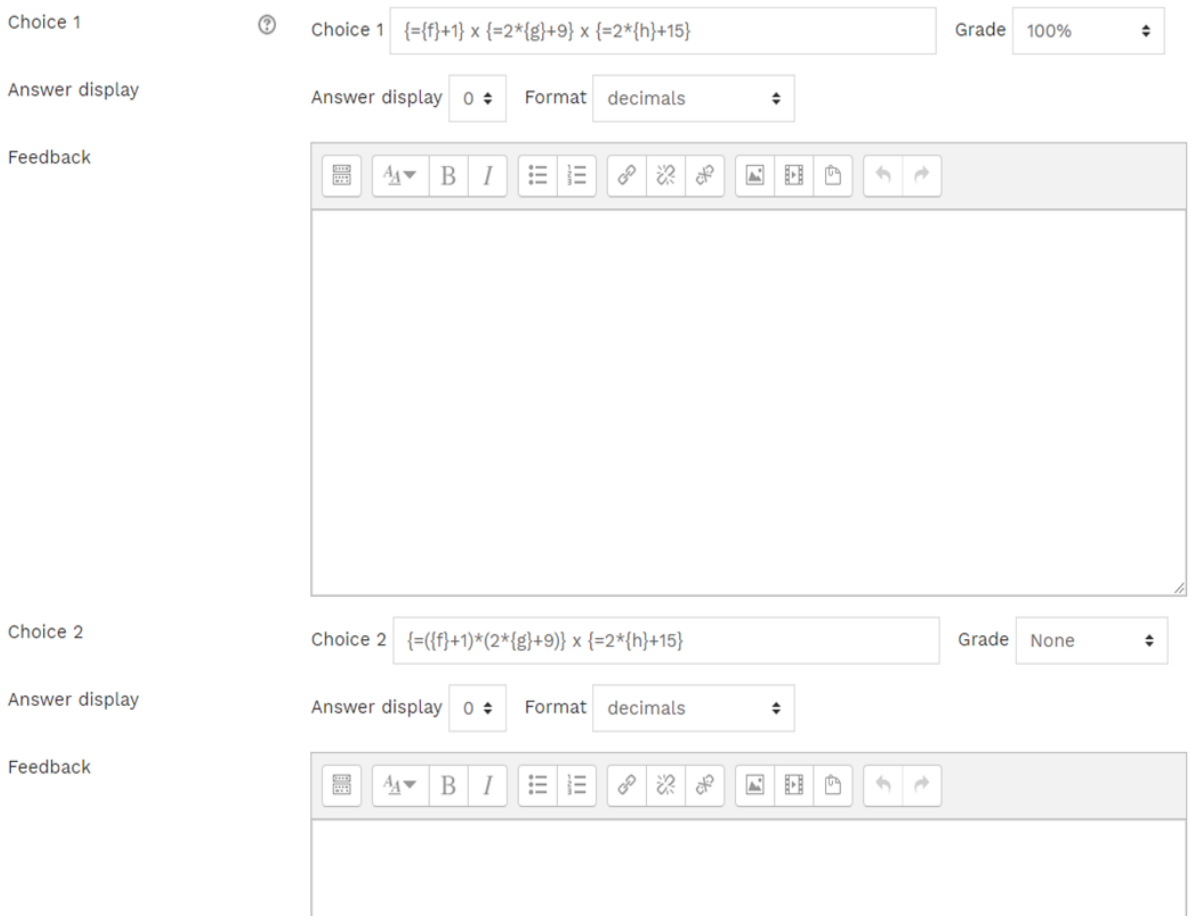


Figure 2: Input of variables to allow for variation

Of course, the precise nature of the question can be varied – this particular version was chosen for simplicity of explanation but can be used for a wide range of applications.

This is undoubtedly a useful application, however it comes with limitations. Moodle does not have many important mathematical functions built in, and it is often necessary to tweak a question to allow for any randomisation. It also does not allow for any graphical randomisation. It is therefore limited but useful.

For further testing, tools such as Wolfram Alpha (Wolfram Alpha, 2017) are extremely useful. However, students use Moodle on a regular basis and having this option available to them is a valuable resource in developing their formative understanding.

Other subjects

Although this article has focussed on mathematics, it is clear how this could be applied to subjects with a core mathematical background, such as Engineering.

Hence this is not limited to Mathematics. Many subjects also involve some level of statistics, for which this could be a useful resource. A clear application would be in the Life Sciences where a modelling question could be created with the various parameters chosen randomly.

Feedback

Following a trial in a Statistics course aimed at Business and Information Technology students, the feedback was overwhelming positive. The primary use of the quizzes for students was that they were very helpful in examination revision, and they found them very useful. In particular, every respondent indicated that it was helpful to have different questions each time they attempted the quiz. There were over ten responses, a sample comment was

"Good – I can repeat and get different questions"

The material was primarily used for exam revision with around 75% of respondents stating that this was their primary use.

This was only a limited trial, but the feedback suggested it would be helpful to roll this out into other courses, which is now being done.

It is clear from the student response that this is a useful technique for formative assessment.

Conclusion

The Moodle quiz system is far from perfect. The limited number of mathematical functions available makes writing suitable questions a challenge. Nevertheless, it has proved to have been successful. It is also an interdisciplinary technique that can be applied to any subject, even though the variation of questions may not be suitable for some subjects.

This is not in any way meant to be a substitute for more formal summative assessment. But as a formative concept, it is a useful tool that can be utilised to help the students gain more understanding, and build confidence as they repeat the tests and progressively obtain a higher score.

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Kahoot! – game-based student response system

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Abstract

Some 76% of adults own a personal smartphone (Ofcom, 2017) and, whilst such hardware was initially viewed as a nuisance in the classroom, many universities are now promoting the use of mobile technology as a teaching and learning aid. Substituting the traditional test paper with interactive mobile quizzing can be seen as a twenty-first century advance in pedagogical methods, both engaging the learner and enhancing the student experience. Within this paper, the authors examine the use of a popular mobile gaming application – Kahoot! – and discuss the merits of implementing its use in higher education.

Introduction

Kahoot! is a game-based student response system (GBSRS), the application of which transforms the classroom into the format of a game show. Via a laptop or pc, the teacher presents questions on the classroom screen and students answer them by means of their mobile devices.

In comparison to paper quizzes and traditional, simple student response systems (SRS), the use of GBSRS, it has been suggested, produces greater student engagement and more enjoyment, concentration and motivation (Wang, Zhu and Satere 2016). Similarly, results from the five-year study by Salaz-Morera, Arauzo-Azofra and Garcia-Hernández (2011) revealed that such interactive quizzes as *Kahoot!* had a positive impact on student learning and that students particularly valued the inclusion of such activities in their programme.

Kahoot! uses bright colours and a combination of graphics and music to build anticipation. Wang (2015) says that a primary focus of *Kahoot!* is the emphasis on 'learning through playing'. This design approach encompasses the ideology of the creators, who wish to make learning more enjoyable. Certainly, results from the study by Wang (2015) revealed that many students became more involved and could better refocus their attention when their lectures included a fun element.

Features and applications

Comprehensive help and guidance is available on the *Kahoot!* website to aid the novice user. However, the simplicity of *Kahoot!* means that creating quizzes is fairly self-explanatory. Indeed, its ease of use was commended in the recent study by Ismail and Mohammad (2017).

There is no payment option or upgrade, as one version is available to all. Joining is incredibly simple: within teacher mode, a sign-in from a recognised email account is required, whilst the student simply enters a unique pin on her/his personal mobile device.

Each quiz can be designed and created to assess, in a flexible way, the knowledge of students in a group. By deploying the quiz at the beginning of the classroom session, the teacher can introduce a topic and assess prior knowledge, so determining where the focus of the session should be directed (Fotaris *et al*., 2016). Conversely, using *Kahoot!* at the end of a session gives scope for reviewing key lecture points and also assessing how much the students have learned (Wang, 2015).

At login, there are four choices for the user: teacher, student, workplace and social, each with a discrete set of features appropriate to the respective user. When 'teacher' is selected, the user assumes control of the game and activates the quiz, generating a unique pin which in turn opens the quiz for the participants. For the duration of the quiz, the teacher has control of the pace, facilitating breaks for further discussion, explanation or debate. A teacher or teaching team can create the quiz at any time, since specific topics and a range of pre-prepared options have been made available by the *Kahoot!* community.

With multiple-choice answers displayed on her/his mobile device's screen, all the student has to do is touch a selection to log it. The teacher uses a pre-set timer to stipulate response time. Consequently, from the number of responses displayed on the teacher's view, it's possible to check that all students have answered. The leaderboard, listing the top five competitors after each question, encourages engagement and promotes an atmosphere of healthy competition. An additional attractive feature for the student is the option to compete under a pseudonym, allowing anonymity for the modest or the shy.

How can this quiz be used in practice?

The features and functions of *Kahoot!* can enhance the teaching and learning experience in a positive manner:

- Conclusions drawn by Bester and Brand (2013) from their research into the use of technology in the classroom indicate that such methodology is now essential and teachers should be less reluctant to embrace it. Creating and applying *Kahoot!* quizzes is so easy that teachers who are less experienced with technology or are apprehensive about using it may find encouragement in adopting this straightforward means of engaging students.

- Results from a *Kahoot!* session can be downloaded to a spreadsheet for the teacher to highlight problematic questions and identify students who may be struggling.

- A function called 'Ghost mode' allows students to play against their last attempt and aim to beat their previous score.

- Quizzes can be shared between colleagues across different sites.

- *Kahoot!* has been used successfully in real-time sessions, with students submitting relevant topic-based questions for the entire class to undertake.

Identified strengths and weaknesses of Kahoot!

The table below exhibits the internal strengths and weaknesses of *Kahoot!*, as well as the external opportunities and threats.

Table 1: SWOT Analysis

Strengths • Attractive, colourful interface • Encourages active participation • Completely free • Multiple question styles • Easy-to-create quizzes • Allows the shy student to answer questions without embarrassment • Shapes are used to accommodate any student with colour vision impairment	**Weaknesses** • Aware of an expectation for quick response, students may guess or answer questions without thorough consideration • Noise generated when large groups of students become excited • Students without a device are not monitored • Being ranked on performance does not appeal to all students
Opportunities • Can be used on most browsers; app available but not essential • Enables social interaction and discussions between class members • Tagging *Kahoot!* quizzes can further discussion and sharing via social media sites • A bank of quizzes is available for adaptation	**Threats** • Limits on characters allowed per question: ninety per question; sixty per answer • If connection is lost, user will lose track of progress • Cannot be embedded within slides without use of third party provider

Student views

Other quizzing platforms exist, such as *Socrative* and *Quizdom*. However, informal student feedback gathered from undergraduate students on our programme indicated a preference for *Kahoot!,* based on user experience and enjoyment. This is certainly consistent with our personal observation: during the course of a game involving these students, energy and enthusiasm within the room were almost tangible, competitive personalities were revealed and social interaction increased – and even involved the quieter and more reserved students.

Conclusions

In times of financial constraints, the fact that *Kahoot!* is a free resource makes it an appealing prospect for incorporation into all levels of teaching. The bright interface and lively music engage and motivate students: our personal impression, from observing groups of up to fifty-seven undergraduates engaged in *Kahoot!* activities, is of an instant surge of energy

in the room, avid participation, light-hearted banter and competition. Consequently, one thing to bear in mind when using *Kahoot!* is to be prepared for increased classroom noise!

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Web annotation technologies for learning

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Introduction

This introduces web annotation tools and standards and their potential to support learning and teaching across a range of activities using existing web resources, with an initial discussion of implications for academic practice. It concludes with a short description of current web annotation tools for text, images and audio-visual resources.

What is web annotation?

To start with, it helps to remind us of traditional uses of annotation in the pre-digital world of paper. These have included 'marginalia' – i.e. handwritten notes in the margins of books, underscores and highlights etc. – used by individuals. More wide-ranging applications of annotation in paper media have included scholarly works, such as annotated anthologies of poetry or annotated bibliographies of quantum physics. From this perspective, web-based annotation is an attempt to recreate and extend that functionality as a new layer on top of the web. This brings all the affordances of the web environment; annotations can be 'published', shared, managed and curated, as well as re-published via social media channels.

Annotations can be linked, shared between services, tracked back to their origins, searched and discovered and stored wherever the author wishes. Web-based annotations enable a reader to interact with web pages to create her/his own content linked back to the original web page and these annotations (and their connections to the original web page) can, in turn, be annotated by others.

Applications for Learning

With web annotation, what is developing are powerful ways of interacting with web content and other web users. These tools bring some great opportunities for education and research. In education, the use case is especially compelling: students have been writing in their books since the book was invented. As books, texts, images and videos studied in schools and college migrate online, these marginal notes can become media-rich and shared with others. In face-to-face, online and blended classrooms, collaborative annotation combines traditional literacy with more emergent understandings of the types of skills students need to develop to be successful in digital environments.

At the I Annotate 2016 conference in Berlin (http://iannotate.org/2016/) a range of educational examples of web annotation were provided including the Lacuna project from Stanford University (http://bit.ly/2nFmBE7) and the PAHSIT project at University of Colorado Denver (http://bit.ly/2EB8BD2). What was striking was that the annotation technologies were enabling the kinds of threaded discussion that we normally associate with forums in Virtual Learning Environments (VLEs). However, in this case, the discussion was happening in the 'annotation layer' centred on shared web resources; the W3C infographic below (Figure 1.)

will help with visualising this, as will the screenshot of the 'Compass' journal article with an annotation (Figure 2.).

Implications for academic practice

A good, single sentence, description of the potential user experience of web annotation is provided by a leading scholarly annotation service:

"A conversation layer over the entire web that works everywhere, without needing implementation by any underlying site." (Hypothes.is: https://web.hypothes.is/about/)

This conveys perhaps the most important thing about web annotations – they are independent of the original web page, exist separately from it and are under the control of the annotator. Yet, to a third-party viewer of the annotations, they co-exist with the original content, because this annotation layer is under the control of the annotator and not the original web page author/publisher. Thus, annotations can circumvent decisions that content owners have made about whether they want 'commenting' in the first place. In academia and elsewhere, this raises important questions about the traditional role of the author, copyright, reputation and ownership.

Technical Architecture of Web Annotations

The W3C (World Wide Web Consortium) is establishing data standards to provide a good foundation for future developments in the key areas of inter-operability, preservation and sustainability. The pages of the W3C web annotation working group (https://www.w3.org/annotation/) provide a good source of information; the illustration (and the accompanying text below) is taken from there and provides a useful visualisation of how web annotation works in practice (W3C, 2017).Each element of SCORE represents the following aspects of our reviews:

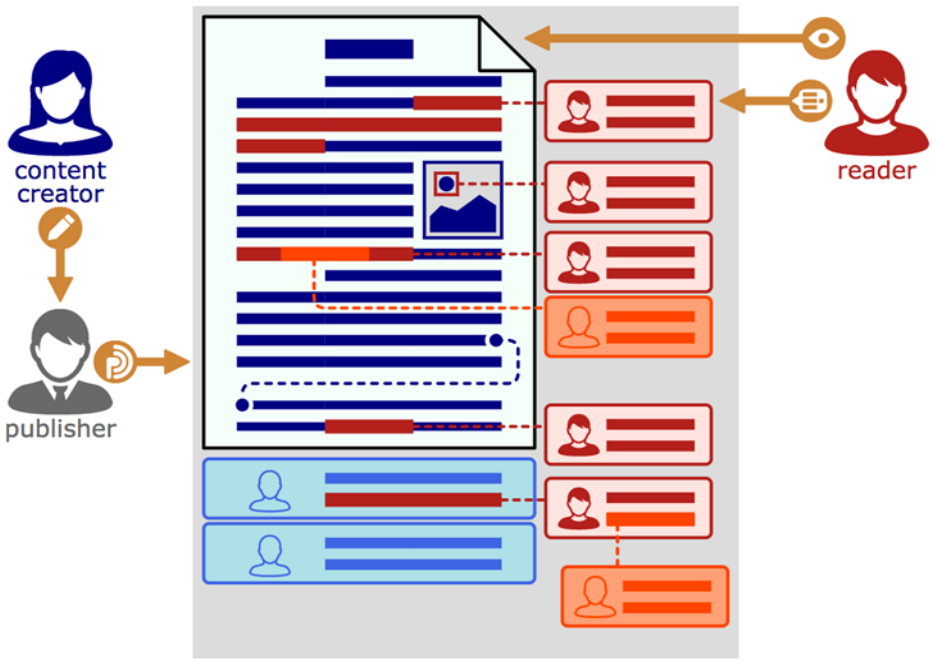

Figure 1: A generic web annotation architecture, showing a reader creating captions (right-hand column) in relation to selections on a web page

> *"With annotations, a reader can target a **discrete selection.** A selection can be text, a section of an image, a location on an interactive map, a timestamp of a video or audio, or a data representation that has an underlying data source. A reader can even annotate a footnote ... or a traditional site comment. Other readers can annotate sections of content that overlap existing annotations ... and even annotate annotations themselves, in threaded replies. "*
>
> *Copyright Statement © (23 February 2017)* World Wide Web Consortium, (MIT, ERCIM, Keio). http://www.w3.org/Consortium/Legal/2015/doc-license

Web Annotation Tools

Annotating textual resources on the web is relatively well advanced, with perhaps the best example being the open source Hypothes.is project (https://web.hypothes.is) that provides a free subscription service for users. An example of a Hypothes.is service user's public annotation of a Compass journal article page is given below in a screen shot featuring a single annotation; the public annotation is also available at this web link: http://bit.ly/2EatgA4.

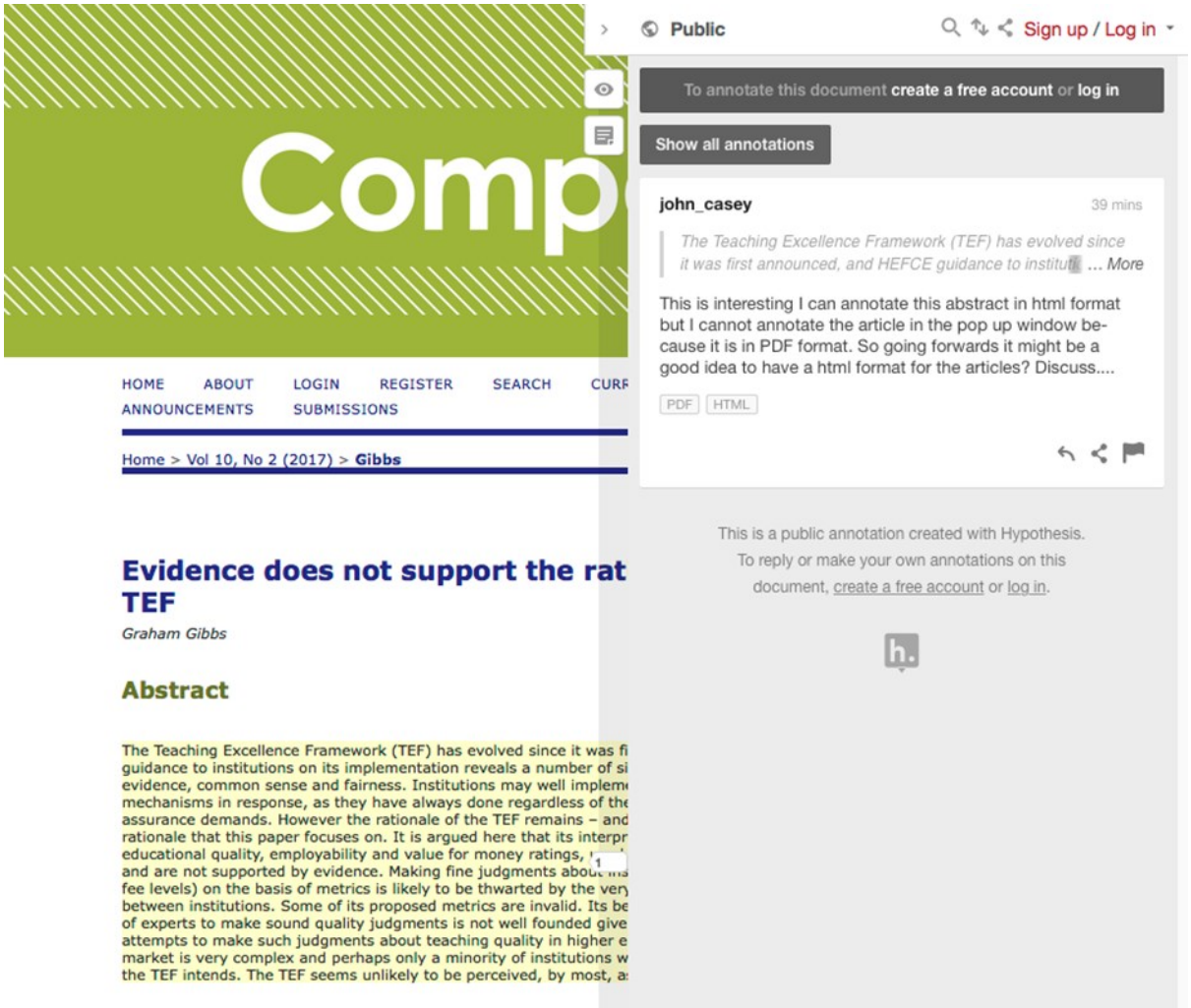

Figure 2: A Compass article page, with annotation available at: http://bit.ly/2EatgA4

Annotation of images is developing rapidly, with work being led by the IIIAF consortium (http://iiif.io). An example of image annotation is given by the work of Digirati with the Wellcome Trust and their development of a Universal Player for the trust (http://bit.ly/2s6785s), with the planned addition of annotations.

Annotation of audio-visual resources on the web is more emergent. In this connection, the work of the Clipper (Clipper 2017) project, funded by Jisc (http://bit.ly/1SizMCd), is providing some useful insights, making it easier for learners and teachers to analyse, manage and collaborate using online audio and video resources.

Student Response Systems: a rationale for their use and a comparison of some cloud-based tools

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Take any lecture or seminar and monitor student verbal responses to questions or contributions to discussions and the likelihood is that a few students will dominate. Others will contribute rarely and many will not contribute at all unless deliberately targeted by the lecturer. Technological solutions to widening participation in face-to-face taught sessions include 'Student Response Systems' (SRS). These are also referred to in the literature as 'Classroom Response Systems' (CRS), 'Audience Response Systems' (ARS) or, simply, 'voting tools' or sometimes 'clickers'. Throughout we use the terms SRS or cloud-based 'tools' as these are the most common terms in our context. Some tools focus on providing an interface for answering questions (from multiple choice to open text), whilst others include student question-asking, voting, rating and discussion options. This article sets out to offer an analysis of six SRS web-based systems that can be used for free (though most have premium options), using a common analytical framework. It should be noted that there are dozens of such tools available, but these have been selected as they represent what we consider to be the best of various types of web-based SRS. Our conclusions are based primarily on functionality and ease of use, as detailed in the analyses set out below. Each tool has its own unique selling point/s (USP), which we have also highlighted.

Although our University has embraced the concept of *digital first* and connectedness as core principles of 21st century teaching and learning, concerns and doubts are often heard in relation to this. The proliferation of mobile devices is often seen as a negative, particularly in terms of their distraction potential. The tendency towards divergent functionality of device types and a range of potential ethical issues (Traxler, 2010) could well be seen as a reason to discourage or even ban mobile devices in lectures and seminars (Brenner, 2015). Academics have legitimate concerns about the use of mobile devices, especially their potential to distract students in lectures. Yet the extent of proliferation, the impracticality of – and likely resistance to – policing of device mis/use and the existing widespread use of such devices for other academic activity, by students and academics alike, make for conditions well suited to their appropriation in classrooms and lectures (Balakrishnan and Lay, 2013). Such appropriation aligns with our broad institutional support for the principles that underpin 'BYOD' (Bring your own device) which seeks to exploit the potential of the expensive and powerful devices many, if not most, of our students carry with them on a daily basis.

Taking control, in effect, of the devices by embedding their use at different stages of a lecture or seminar, is one way to minimise temptation towards distraction while maintaining other benefits afforded by mobile device use, such as note-taking and language support. One of the authors has delivered CPD sessions which have highlighted the potential of the tools analysed below across the University. Colleagues who have then gone on to use one or more of them have reported real benefits in using SRS because they provide continuing opportunities for interaction. For example: students can pose questions as well as answer them; individuals or groups can post text wall comments; the lecturer can utilise slide management options to focus attention in different ways. Many colleagues have made a

point of saying how they have achieved this despite perceiving themselves as anything but 'tech savvy'.

Early SRS were dependent on the use of sets of 'clickers' (physical voting devices that were issued to students at the start of a lecture). Like their more recent internet-based (more typically referred to as 'cloud-based') and mobile device-dependent counterparts, reported benefits include improvements in academic achievement (Kay and LeSage, 2009), instant feedback to the lecturer on breadth of understanding (Keough, 2012) and higher levels of engagement and satisfaction (Hedgcock and Rouwenhorst, 2014). Other benefits include: engagement through 'fun' and student-student / student-lecturer dialogue (Blasco-Arcas *et al.*, 2013); boosting attendance and providing opportunities for reflection (Bojinova and Oigara, 2011); the promotion of active and student-centred elements in a didactic environment (Caldwell, 2007). Clicker options can often be subject to practical barriers to their use, not least the fact that initial costs of device purchase and installation can be high (Hedgcock and Rouwenhorst, 2014). Whilst many of the reliability issues have been resolved since clickers first appeared in the 1960s, frustration with establishing connections (Kay and LeSage, 2009) and equipment failure (Hedgcock and Rouwenhorst, 2014) remain a concern – this is one reason why our institution has focused on surveying options that are cloud-based and are BYOD dependent. The main concerns related to cloud-based solutions are the strength and capacity of Wi-Fi in large lecture spaces and students' willingness to use their own personal devices.

As with all technology used to support teaching and learning, it is the underpinning pedagogy that should drive the choice of tool and the way in which it is used (Beetham and Sharpe, 2013). When using SRS, lecturers need to understand and be able to articulate their goals and be suitably prepared, since wasted time and questionable relevance will reduce student commitment to participation (Nielsen *et al*., 2013). Whilst it is not the goal of this article to discuss pedagogy, it is worth sharing the question that we ask ourselves whenever we are thinking about deploying a SRS: "What does it add in terms of engagement, interaction or communication that couldn't be achieved using traditional approaches?"

We spent some time looking at and trialling a range of SRS options. Each needed to offer lecture/seminar interaction potential and be free or available on a 'freemium' basis (i.e. available for trial with paid add-ons or extensions to functionality; the free elements are designed to attract a proportion of users to purchase premium options). To evaluate these tools, our criteria were: their potential for engagement and participation (a challenge to passive pedagogic approaches) and how easy they were for staff and students to use. The next section gives brief summaries of each SRS system. Each of these is followed by a summary of key points found in our analysis of the tools by means of the 'SCORE' system (Graves, 2008), which we have interpreted and adapted as set out below. SCORE is a response to perceived inadequacies of the 'SWOT' (Strengths, Weaknesses, Opportunities, Threats) analytical model and, given the opportunity to construe the model according to our own needs and criteria, we have found it an effective analytical and comparison tool that may also be applied in future to other technology or educational resource reviews.

Each element of SCORE represents the following aspects of our reviews:

Strengths: We interpreted these as perceived good points, effective aspects of the tool and, where relevant, any unique (or unusual) selling points.

Challenges: Here, we focus on limitations to the tool itself and also include key constraints in its use – from both lecturer and student perspectives.

Options: All the tools here are either free or work on a freemium model. Some tools limit the number of students in the free version (e.g. Zeetings), whilst others limit the number of polls or questions you can use per presentation (e.g. Slido/ Mentimeter). As many SRS have institutional markets in mind, they offer a broad range of licences and packages – appropriate to the needs of every buyer from individual to whole institution and costing from a few pounds to tens of thousands. It would be impossible to capture the breadth of this but we have tried to highlight those aspects of functionality incurring cost that we consider to be of most potential value/relevance to academic users.

Responses: In the original SCORE model this refers to the response by the outside world to the strategy under review. For the purposes of this paper we have here focused on what it offers in terms of student engagement.

Effectiveness: These comments, both by the review team and arising from discussions with colleagues who have trialled the tools in question, are inevitably subjective. Such aspects as relevance to different contexts, efficiency, reliability, elegance, appropriateness and potential for integration with core systems (e.g. the Virtual Learning Environment) have guided our brief conclusions.

Below are our SCORE analyses of Todaysmeet, Slido, Polleverywhere, Mentimeter, Socrative, Kahoot and Zeetings.

Todaysmeet (https://todaysmeet.com/)

The Todaysmeet strapline is ‘ Enhance classrooms. Enable discussions. Empower students.’ It is designed to act as a ‘backchannel’ to any taught session, providing a secondary layer of discussion or conversation to the topic. Of all the tools, it has the fewest functions, but that means it is simple to use. It is primarily a ‘text wall’ system that can be used either synchronously in taught sessions or for collaboration and discussion outside of face-to-face classes. Students go to a unique web address (URL) provided by the lecturer or scan a Quick Response (QR) code with their mobile device (if they have a free QR scanning app enabled).

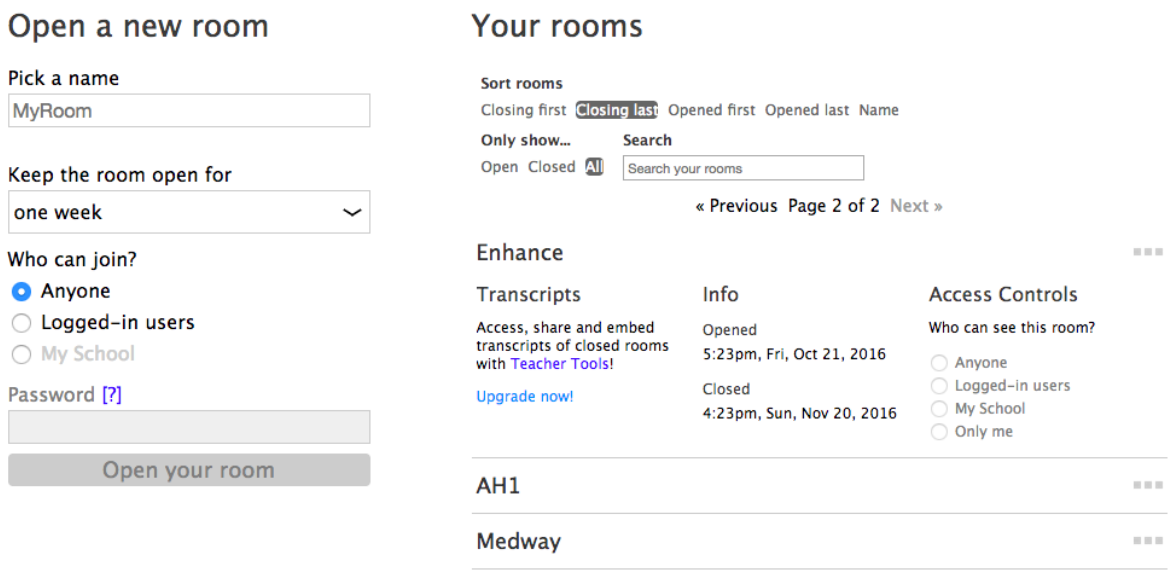

Figure 1: Todaysmeet lecturer window, showing options and records.

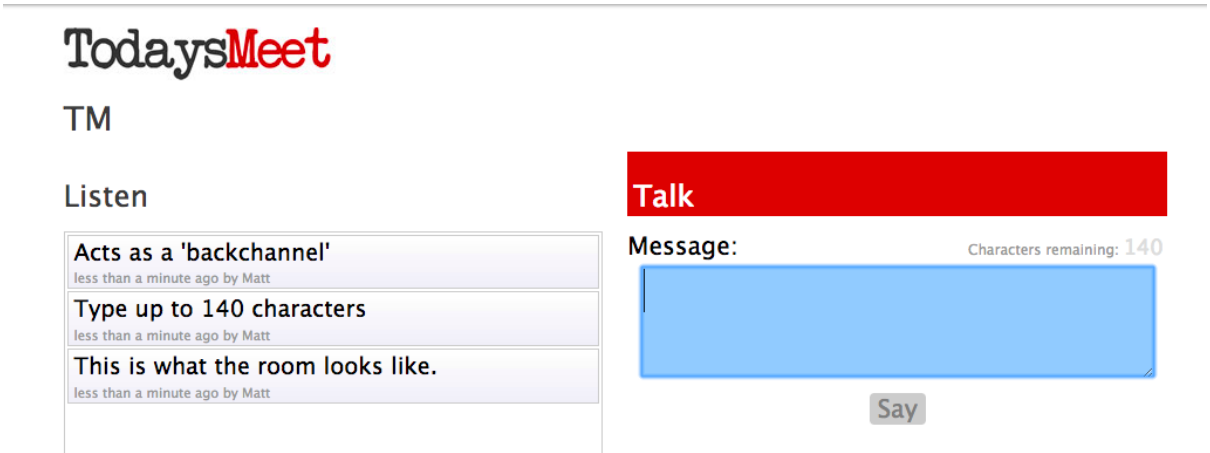

Figure 2: Todaysmeet student interface. Students type in the blue box and their message appears at the top of the contributions. The responses can be displayed full screen.

Todaysmeet SCORE

Strengths	Challenges
Provides lecturers with a method of discussing work and key ideas in a session and of offering feedback outside of the classroom. Students can contribute by accessing a lecturer's created link and then collaborate and share ideas in that link's unique 'room'. Lecturers can set a time limit for how long a room stays active. Lecturers are able to keep track of what goes on within rooms, delete inappropriate content and secure rooms with a password.	Consists only of a text-based chat room. Lecturers may find that the ease of use prompts a deluge of responses or questions that is hard to monitor. No profanity filter (though presenter can easily delete posts). Messages are limited to 140 characters. No multimedia options such as videos or images.

Effectiveness
The beauty is in its simplicity of use (both in setting up and for students). It also generates a large QR code, for ease of access via mobile devices, and clear presentation options for large lecture halls. More efficient contact between lecturer and student than email, so has the potential to be used for collaborative work outside classroom time. To make sure that only appropriate content is posted within a chat room, the lecturer is able to regulate content being posted within the room and set time limits to availability of specific rooms.

Options	Responses
Offers a monthly subscription of £3.86 and an annual subscription of £43.98.[12] Subscription grants: permanent access to transcripts; ability to pause rooms until they are next needed; limitation to spaces within rooms for students at own institution; ability to mute unruly students. All rooms generate embed code for Virtual Learning Environment (VLE) use.	Less vocal students can be heard more effectively as they are given an alternative, less-threatening medium of communication. Wider and potentially more immediate and dialogic lecturer-student / student-student communication than emails. Requires virtually no training for participation. Like all the tools, it does, of course, necessitate access to a device.

[12] All prices and URLs current as of 27 September 2017

Slido (https://www.sli.do/)

Slido (or Sli.do) is promoted as a conference/event interaction tool. It is designed primarily with smart phones and tablets in mind and offers both polling and options for the audience to ask questions of the event hosts which can be 'upvoted' in the free account (i.e. other students can show approval or agreement with questions and the most popular are pushed to the top of the list) or downvoted (pro accounts only). Students go to the standard URL (above) and enter a unique 'event code'.

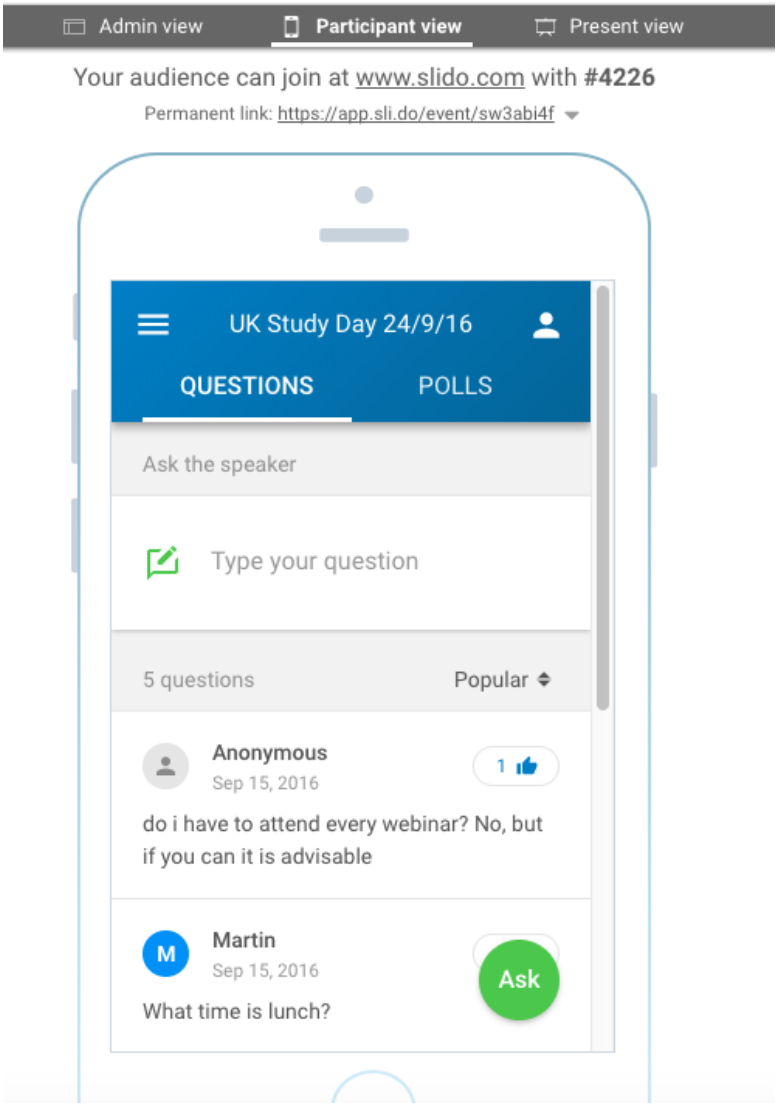

Figure 3: Slido screen as it appears on a mobile device for students. The 'questions' are those that the students ask the lecturer and the 'polls' those asked by the lecturer. Note the 'Admin' (i.e. lecturer) and 'Present' views and the joining instructions. These are much larger in 'Present' mode.

Slido SCORE

Strengths	Challenges
Polls can be set up within a matter of minutes and be in multi-choice, open-text or ranking formats. Lecturer can prioritise questions voted by large proportions of students. Enhances interaction with less vocal students. Lecturer is able to test and show the interface of event from the viewpoint of students.	There is no moderation control on free accounts. Free account offers unlimited events but only three polls per event. Many of the services available within Slido are unusable by free accounts and costing per event and payment plans are quite expensive. Switching between lecturer view, student view and presentation (of poll results) is tricky initially.

Effectiveness
Once the lecturer is comfortable with the system, the combination of polling and question-asking is very effective and works especially well with very large groups. Requires lecturers to switch between presentation tools used and the Slido interface which can hinder session fluency.

Options	Responses
One time (Private £119, Pro £199, Premium £599), and Edu (Lecturer £50, Department £125, Institution £325) payment plans available. Discounted payment plan for educational institutions. 'Down voting' feature in paid accounts allows both lecturers and students to regulate questions added to an event. Twitter integration can be implemented by identifying an event hashtag in all accounts. Event analytics and instant infographic generation available in all accounts, but surveys, video-embedding, data exports, support and branding only with *Pro* and *Premium* accounts.	Encourages good responses from the less vocal students and some features (e.g. word cloud generation) prompt additional interaction once one or two people have begun contributing. Depending on audience, the ability to self-moderate questions is open to abuse. This feature does heighten levels of engagement, however. Assists in keeping the attention of students through the use of polls which can be set up while presenting.

Polleverywhere (https://www.polleverywhere.com/)

Polleverywhere is a United States-based lecture and event interaction system. Students can respond by text message or via a unique (to the lecturer) Polleverywhere link, which remains the same when the lecturer changes the poll in the lecturer area. Alternatively a range of poll types can be embedded into presentation software (PowerPoint, Keynote or Google slides).

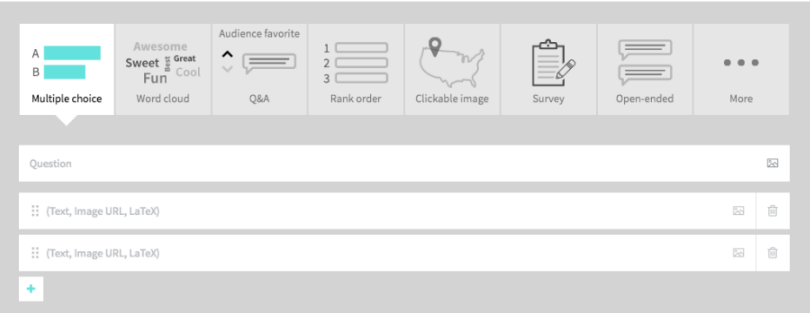

Figure 4: Poll creation window. Note options including 'clickable image', which is a unique element.

Figure 5: Poll settings and options with display showing instructions for students. Note text messaging option, along with standard URL response space online. Single URL (rather than access code) means each new question has to be activated.

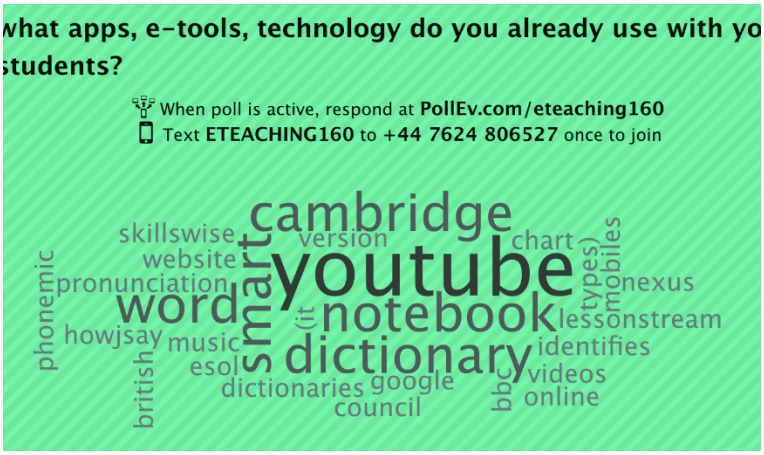

Figure 6: Sample output display. This is the word cloud option.

Polleverywhere SCORE

Strengths Offers the students alternatives to participating in polls via a text message. Offers several variations to gather quantitative data from the audience and plugins that allow the lecturer to integrate polls within PowerPoint and Google slides. Lecturer is able to add additional polls while presenting via the polls tab. Lecturer has full control over how many times a student can respond to a poll as well as whether they can access polls anonymously. Lecturer has control over when a student will see a question as well as being able to set a time limit for when the poll locks.	**Challenges** Free version offers no method of moderation. Basic free plan limits the number of responses to twenty-five, and the higher education edition limits the number of responses to forty, though there is no limit to the number of polls a lecturer using a free account can create. When further questions need to be added during a presentation, having to navigate to the poll interface may disrupt the flow of the presentation. Limited multimedia options.
Effectiveness Integrations with PowerPoint and Google Slides plugin offer more flexibility to this SRS, though may be subject to institutional download policies and software versions. Lecturer can keep a record of entries received from polls through a downloadable Excel file. The look and feel as well as the range of poll types (some of which are particularly creative and engaging) make this a very attractive option.	
Options Offers customised, institution-wide options as well as a student and instructor payment plans: Student 'Pays' (£10 annually per student where responses are class-size-limited) or Instructor (£251 per semester, 400 responses per poll username). Both options add a range of question types, live word clouds, text walls, customised look and styles, correct answer display, reporting and grading team competitions, moderation, automatic censoring, custom keywords, VLE integration, share polls among lecturer options, FAQ and email support.	**Responses** The different variations of poll activities provide methods of maintaining students' attentions for longer periods of time. Offers rating activities that assist the lecturer in prioritising topics the audience is most interested in, as well as in gaining a better understanding of the overall mood of the audience. Icebreaker activities offer a smoother transition into group-based activities among students and build confidence in use of the tool itself by students.

Mentimeter (https://www.mentimeter.com/)

Mentimeter is another meetings, events and lecture interaction tool; the company is based in Sweden. Unlike other tools it is designed so that it can be used synchronously in taught sessions (students go to the standard menti.com link and enter a room code which is generated by the lecturer) or asynchronously via a permalink so that responses can be entered at any time and Mentimeter can then act as a research tool.

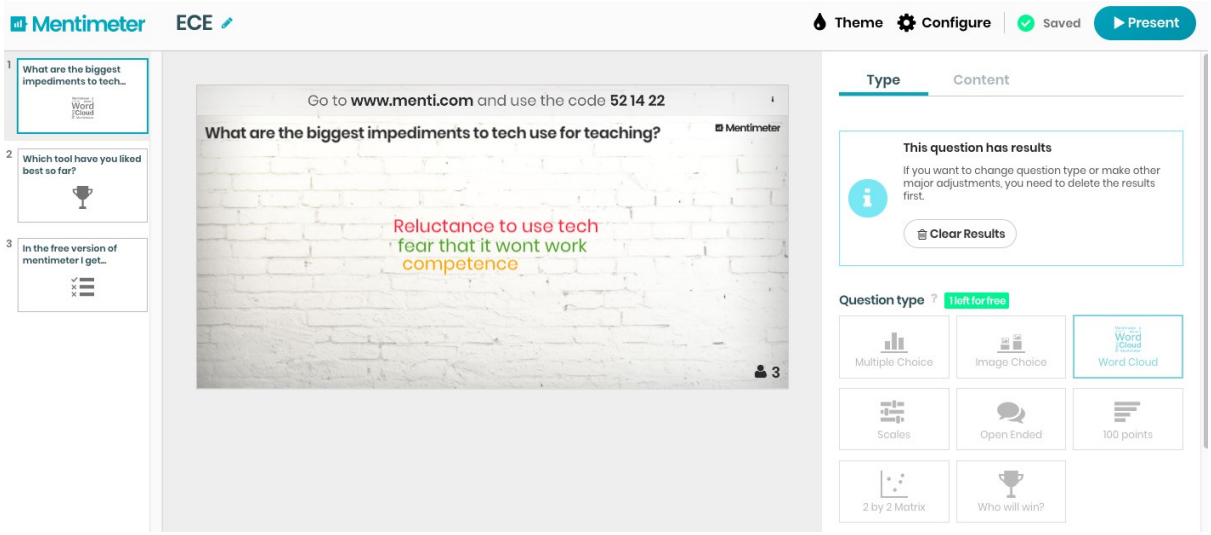

Figure 7: Mentimeter lecturer window showing question format options, numbers of questions available (limited in free account) and formatting/configuration options. It is also possible to insert unlimited slides via this window. When ready, the slides/ questions are launched using the 'present' button which displays the first slide.

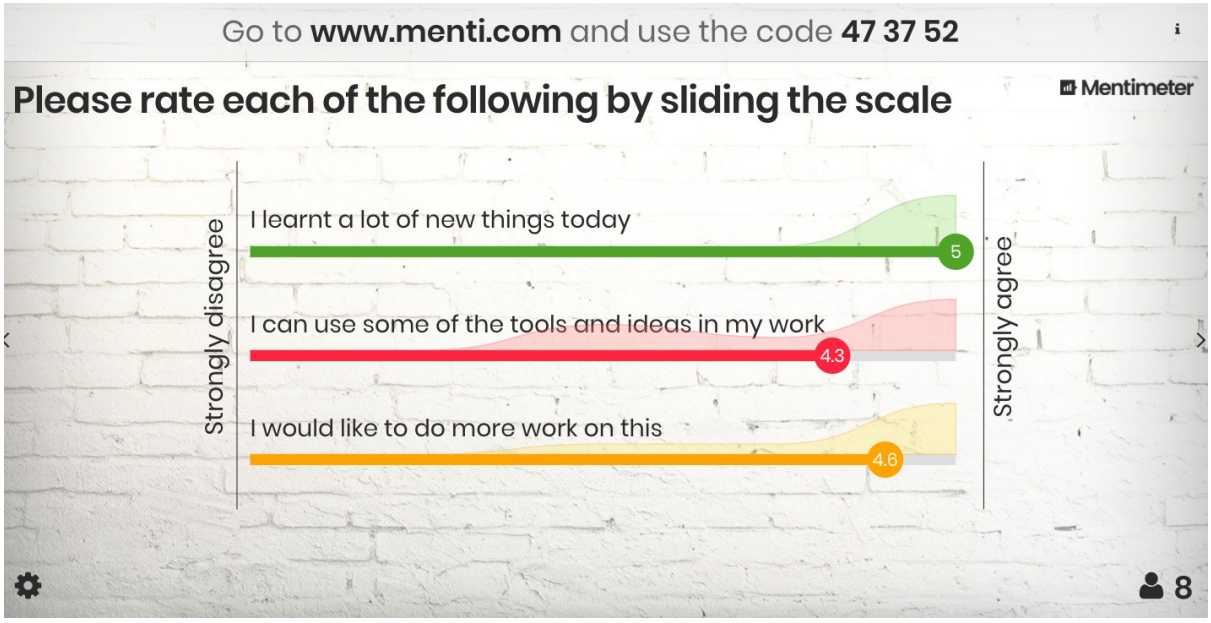

Figure 8. In presentation mode, the screen displays the active poll or question and the results (choice between immediate display or delayed allowing time for all contributors to comment without being influenced by others). Note the number of students (bottom right), the navigation arrows (either side) and the joining instructions at the top.

Mentimeter SCORE

Strengths Clear interface that lists presentations with no limits to question types or number of respondents in free account. In terms of navigation, presentations within cloud-based Mentimeter make use of an interface similar to that of PowerPoint. PowerPoint Slides can be imported into Mentimeter by saving slides as images. Image and video upload options. Includes a wide range of closed and open question types and a competitive quiz option.		**Challenges** Mentimeter PowerPoint integration limits lecturer to 5 Mentimeter questions. On free accounts, lecturers are limited to two poll activities and five quiz questions (an additional poll and question can be 'earned' by e-mailing a recommendation to a colleague). Branding and colours may be customised only through a paid subscription.
	Effectiveness In our view the easiest quiz-authoring system of the all the SRS tools that have multiple question formats. Moderation and profanity filters (multi-language) as standard and option of presenter or audience-paced responses. Particularly effective where basic slide information is needed to contextualise interactions and even more effective when embedded into online presentation tool or plugin is used in PowerPoint. Both of these negate the need to switch between presentation and SRS. Instructional material for lecturers and support are very good.	
Options In addition to locally-negotiated, institution-wide options, Mentimeter offers a range of priced options for single-user educational accounts from £3.50- £15.40 per month. The basic package includes: unlimited audience size, anonymous voting, quizzes for students, unlimited questions, security and privacy, export results, tech support. Site licences can add the ability to customise style, share lecturer presentations across accounts, branding and advanced visualisations.	**Responses** 'Reaction' feature is quick method of testing classroom engagement – this feature can be used to see who in the classroom agrees or disagrees with a displayed statement. Familiar social media icons can be activated by the lecturer and used by students to show engagement, enjoyment, confusion etc. Very varied integration types including a student opinion/ questions to lecturer option. Through the use of asynchronous open-question activities, it is possible to gain insight into student views or use it as a research tool which allows for comparison and cross referencing of data.	

Socrative (https://www.socrative.com/)

Socrative is a quiz tool that pushes the gamified approach and lecturers use their own space to create quizzes. The tool generates a unique room number for students which is accessed through the standard URL above. It is optimised for smart phone and tablet use and, although authoring can be fiddly, the student experience is simple and intuitive.

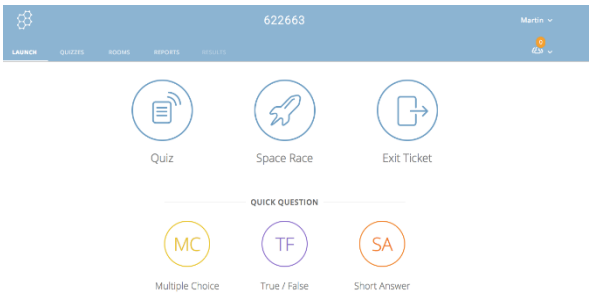

Figure 9: Socrative 'Lecturer' app showing quiz options. Note the *ad hoc* 'MC', 'TF' and 'SA' which enable the tool to be used for unplanned, verbally-delivered questions.

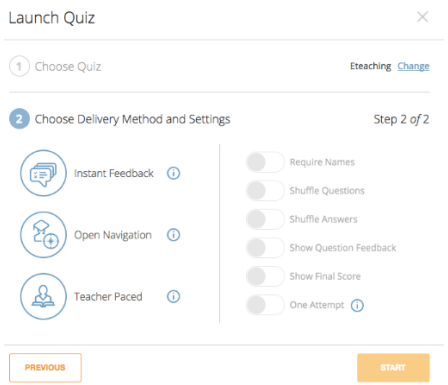

Figure 10: Socrative Lecturer options

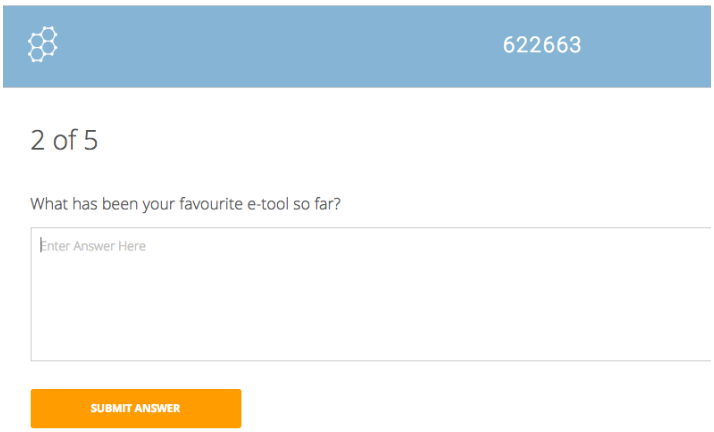

Figure 11: Socrative Student app. This is accessed via a separate link (or different mobile app) and the quiz is accessed via an access code unique to the lecturer.

Socrative SCORE

Strengths Use of gamification elements designed to increase excitement, fun and class engagement. In the event of repeating quiz-based activity, lecturer can alter the order of questions, to see what students have picked up. Lecturer is quickly able to develop quiz-based activities online, or offline through an Excel spreadsheet. Possible to check classroom engagement through quick-question activities, which can be set up during a lecture. Offers immediate post-quiz emailing of results to lecturer.		**Challenges** Activities are limited to quiz-based activities only, which get repetitive. No system in place that allows students to ask questions in relation to quizzes. Only one activity can be active within each room at a time. It is perceived by some as being more appropriate to younger students and certainly has a school 'feel'.
	Effectiveness Whilst there are activities aimed at groups and individuals, implementation of multimedia features, such as video clip and audio files, is not possible. The facility to email a report of results immediately after the quiz is particularly easy and useful if the lecturer is keen to gauge an individual student's progress. Lecturers can prepare pre-set feedback to students which is determined by the answer that the students give. Possible to set up activities that can remain active outside the classroom. No limits to the number of attempts students can make so can be an effective formative approach.	
Options Annual Payment of £43 in higher education institutions includes a range of additional features, tracking and email support. Additional features within the gamified 'Space Race' activity are made available, as well as a countdown timer, shareable links and advanced data export features. Gives access to ten rooms, private and public.		**Responses** Competitiveness in response to gamified group elements often positively impacts attention and enjoyment. Possible to keep track of student progression by reviewing their answers within reports that can be accessed online or downloaded in a range of formats.

Kahoot (https://kahoot.com/)

Kahoot is another quizzing tool that emphasises the gamified approach. It is purely multiple choice and the entire tool is currently available free. Students access the quizzes via a unique URL (self-paced) or via the kahoot.it URL by entering a unique 'game PIN'. Students select their answer in a competitive and time-limited environment that employs colour, music and leader boards to suggest a quiz show type format.

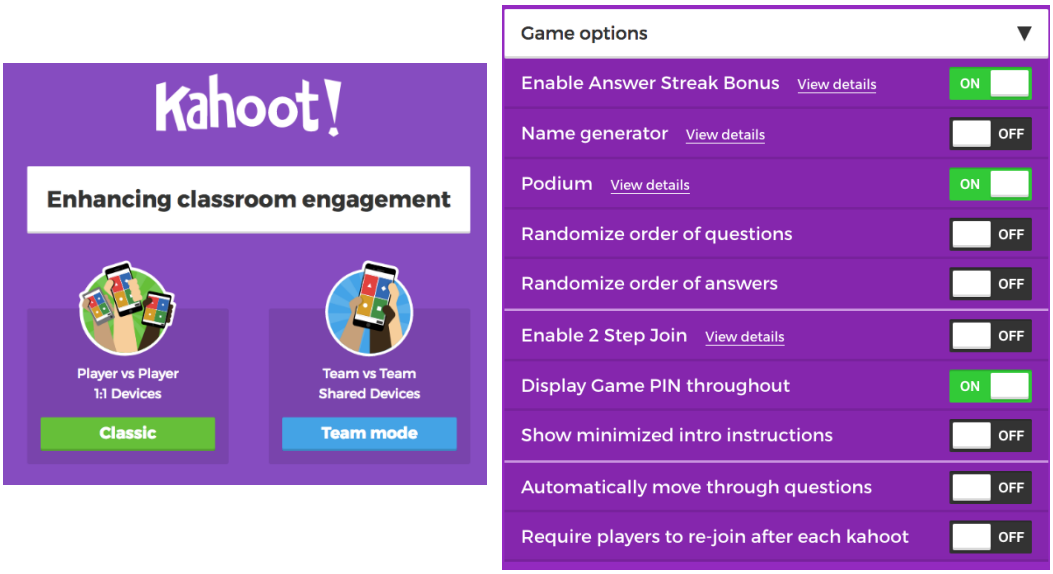

Figure 12: Kahoot lecturer launch screen (left) with options menu (above)

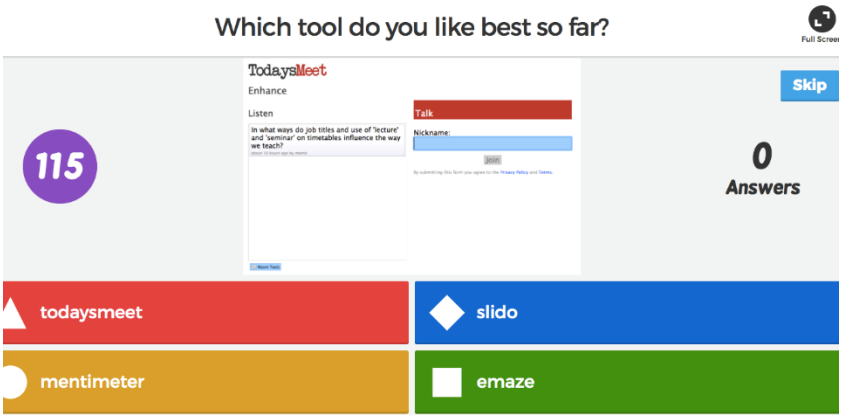

Figure 13: Screen displayed at front of class or lecture hall. Note countdown timer on left (can be set for different times). Also note that students use their own devices to vote (by colour or shape) but they do not have the questions on their devices.

Kahoot SCORE

Strengths Makes use of gamification elements to increase classroom engagement. Offers two variations of quiz-based activities which focus on individual interaction. Offers a survey activity which allows the lecturer to gain quantitative data from students. Has a feature that allows lecturers to develop quick questions during a lecture. Allows use of multimedia features, such as images and video within activities. Has an interface for videos that allows lecturer to play a specific portion of a clip.		**Challenges** Limited to multiple-choice questions. Students are unable to post their own questions through the service. Time-limit element may cause students to rush to answer questions instead of analysing them; it generates tension and anxiety and, though it certainly increases student motivation, could well have a negative impact on those with neurodiverse conditions or disabilities. In competitive mode, the questions are displayed only on the presenter's screen, not on the students' devices.
	Effectiveness Can integrate well with media resources such as images and videos. Can be integrated within PowerPoint through the use of third-party plugins; however this may have a detrimental impact on the overall performance of PowerPoint. Reliant on the lecturer use of a large screen, so that questions can be seen by students. Clearly targeted at school children, but we have seen it used very effectively with undergraduate groups.	
Options Although Kahoot has launched pilot corporate accounts and intends to monetise through premium services and solutions for corporates, there are currently no restrictions governing the services available within Kahoot.		**Responses** Through gamified elements, students are more competitive and excitement is palpable. Students are unable to see the question on their own devices which can frustrate and lead to students opting out. Assigning groups can enhance collaboration and communication skills among students.

Zeetings (https://www.Zeetings.com/)

Zeetings is an Australian-based tool that is relatively new to the market and offers something unique: the ability to upload slides and then insert staged interactions and video; furthermore, when accessed via a fixed lecturer URL, the slides progress at the lecturer's pace, thereby effectively taking full but unobtrusive control of the students' devices for the duration of a session. Students interact wherever the lecturer places a poll or question, but can also interact via a live discussion option and take notes in their own window.

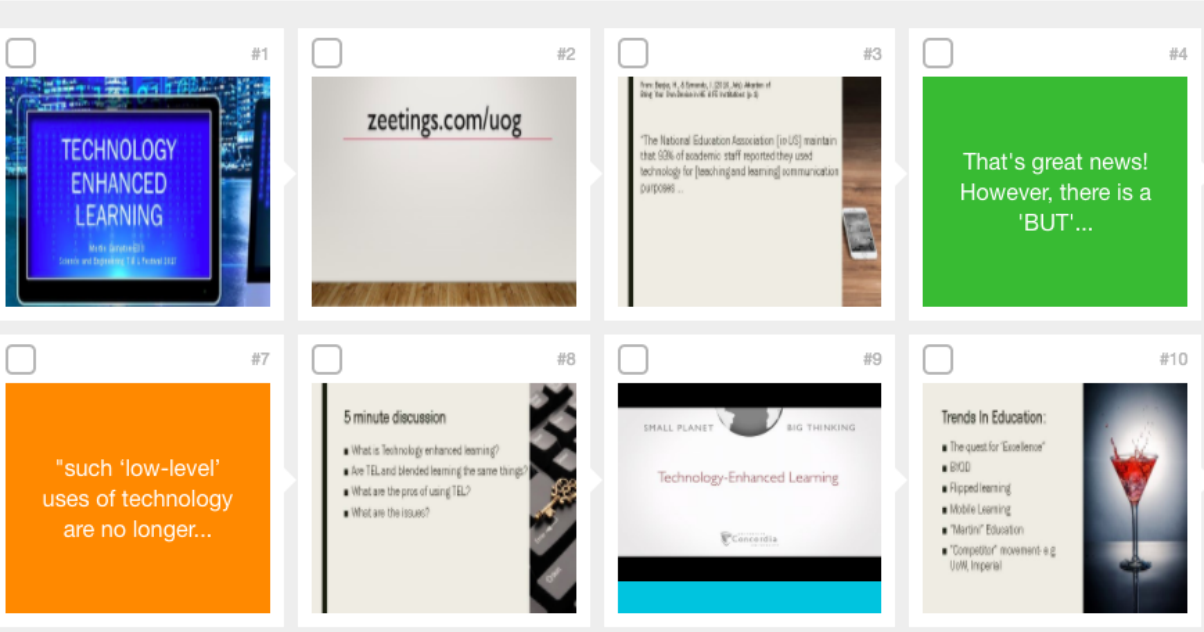

Figure 14: Zeetings lecturer interface. Slides are uploaded from PowerPoint and the interactions are then inserted in sequence. Note: YouTube videos can be inserted to run seamlessly within the slides.

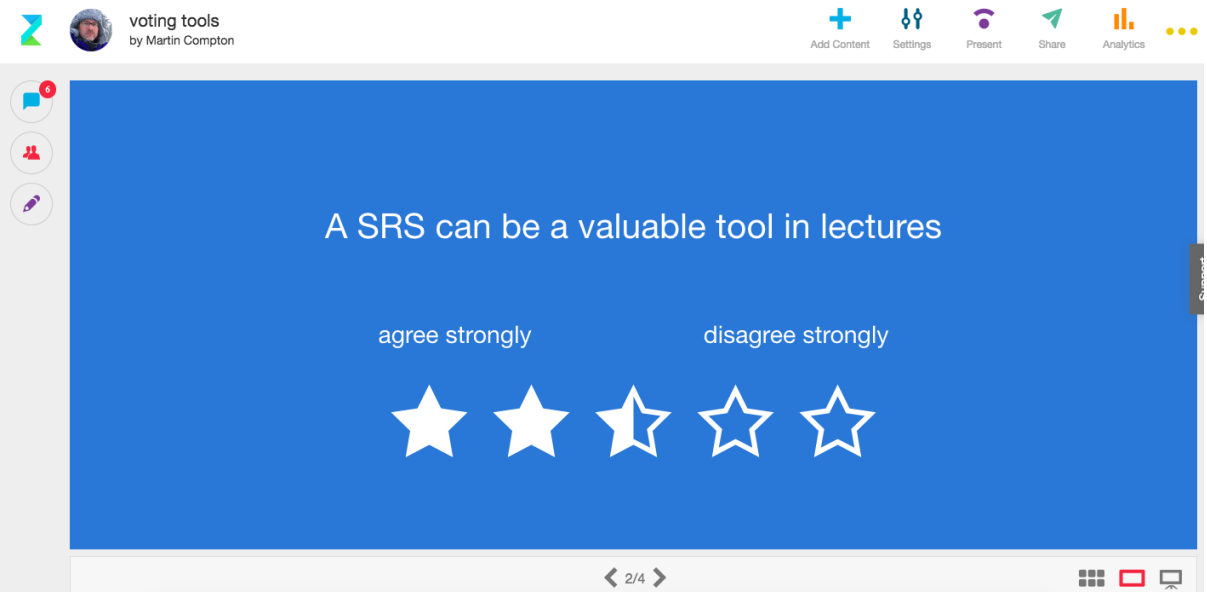

Figure 15: Zeetings interaction slide. Note the tools on the left, which include student note-taking space and optional discussion forum. The responses can be displayed as they arrive or when released by the lecturer.

Zeetings Score

Strengths	**Challenges**
Supports PowerPoint upload, video embedding and slide creation along with interaction in form of open text, rating and multiple choice. Takes control of student devices by managing slide advance. Includes a discussion forum and student notes options adjacent to slides. Upon logging in, the lecturer can access an easy-to-follow tutorial on Zeetings' functions. Allows lecturer to gather responses from students who did not attend the live presentation; they can move through it at their own pace.	Limited to twenty-five students on the free version of the account. Only three interaction types available in free account. Individual poll responses cannot be viewed within Zeetings without an upgraded account. Poll responses can't be exported without an upgraded account.

Effectiveness
PowerPoint and pdf file formats can be integrated within Zeetings, but cannot be edited further. Nevertheless, this feature makes the possibility of slide and interaction easier than any other tool.

The social media icon integration, discussion and notes options, along with the lecturer-controlled pacing of slides, give this tool the widest range of USPs.

Offers integration with a range of media resources through the use of embed codes.

Options	**Responses**
Offers three monthly payment plans for education institutions; these are: Classrooms £6.94, Seminars £12.35 and Lectures £19.29. *Classrooms* offer up to fifty students per presentation, unlimited presentations, advanced analytics plus exports and email support. *Seminars* offer up to 250 students per presentation and *Lectures* offer up to 500 students per presentation.	Students have a range of interaction options while working at presenter pace and can mail slides to themselves for review after the session. Students are able to post their own questions to the presenter. Gives students who are less vocal the opportunity to be heard in multiple ways. The versatility of the embed function, offers more methods of holding the audience's attention.

Conclusions

We have used all of these tools ourselves in a range of settings and have also seen them used by colleagues in situations ranging from large lectures to seminars and laboratory-located sessions. There is no doubt in our minds that each can add to levels of engagement and interaction and, given the ease with which most, if not all, can be used to create resources, we would argue that all lecturers should be encouraged and supported in trialling at least one if they have not used such systems before. We hope that the above summaries will help colleagues decide which to use or at least prompt them to have a look at whichever has the most immediate appeal. At the time of writing, we are pushing to integrate at least one of these tools across the University, but, as individuals within the institution, we would advocate that all of the above are promoted and that their use at individual, department or even faculty level is supported with training and/or the resources supplied. Further, we would argue for licences for extended use and pro features be purchased, according to need, within faculty budgets.

Of course, care needs to be taken, whichever tool is used, to alert students to institutional policy on bullying and trolling. Our own approach is to say that comments that appear on screen will be dealt with in the same way as if someone stood up in a lecture and shouted them. Whether data exports are offered free or in paid accounts, lecturers should always attune themselves to data protection guidelines. If there is any doubt, they should encourage use of anonymity settings, pseudonyms or first names only. Above all, they should always know what they expect of students and apprise them of those expectations and of what they will be sharing. Such concerns are valid, as are continuing worries about encouraging rather than discouraging mobile device use. However, and whether we are entirely comfortable with it or not, we in higher education need to reflect the digital and engagement agendas in our delivery. We think that these tools, if chosen according to need, cohort types and pedagogic approach (and with due consideration of each lecturer's current relative comfort with technology integration), can add layers of engagement and breadth of interaction that will inject additional vigour into *any* taught session in *any* discipline.

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Using technology as a way of evolving assessment practice

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A 30-credit, level 5 land law course is delivered to around ninety students per year in the University of Greenwich, a post-1992 UK University. The original assessment regime consisted of five items of assessment:

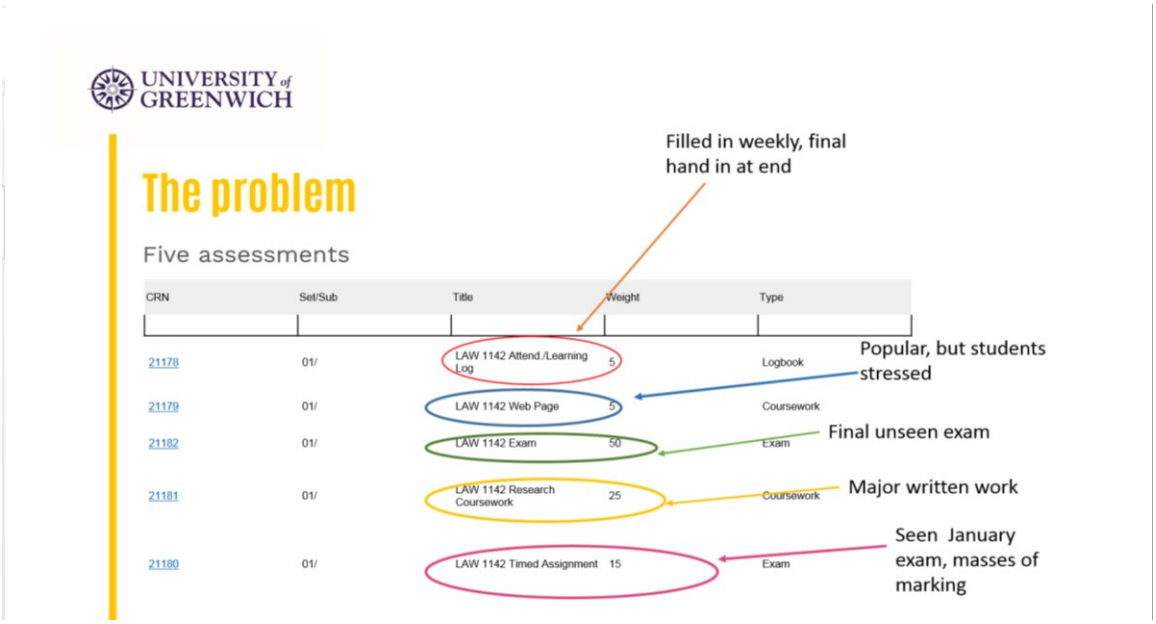

Figure 1: The problem

Although each of these assessments had a sound justification individually, some small-stakes assessments were either too stressful (the effort required to produce and upload the web page/online poster accessed only 5% of the total marks for the course) or tripped up even diligent students (though all students uploaded the learning log weekly, some of them forgot the final hand-in). The timed assignment, a seen examination sat in January each year, was a very good formative and summative assessment, but generated piles of long, hand-written scripts which were very difficult to mark and return within the fifteen working days required by the Assessment and Feedback Policy of the University of Greenwich.

Such considerations, together with proposed changes to professional legal education, made it a sensible time to consider alternative methods of assessment – those using learning technology. Key drivers for change were:

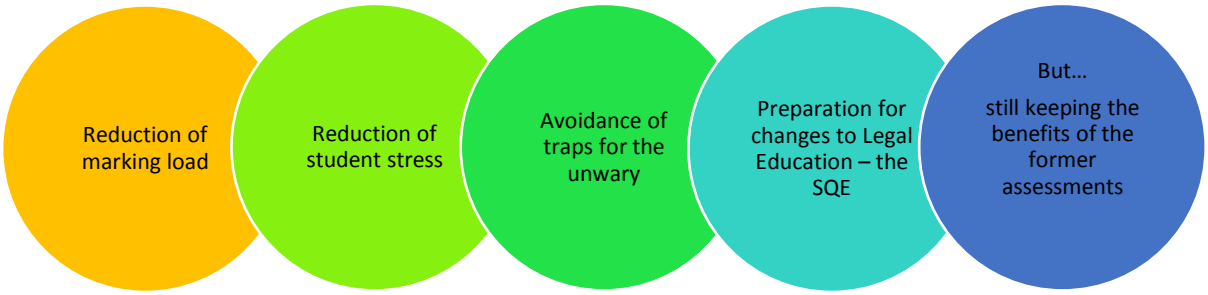

Figure 2: Key drivers for change

Decisions made fell broadly into three categories:

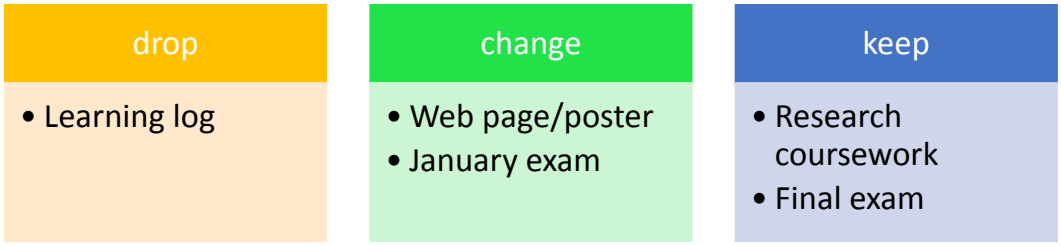

Figure 3: Change decisions

This article will concentrate on two items of assessment which it was decided could be assessed in a different but equally effective way by utilising learning technology already available within Moodle.

1. The web page/poster assessment

The web page/poster assessment has been previously described by the author (Clarke *et al.*, 2010). Briefly, the task requires the student to choose and photograph any object (a chair, a bridge, a statue) and to apply the law to determine whether that object forms part of land or remains a separate chattel, using the authorities studied in the early part of the course. To alleviate the marking load, a rubric was set up in TurnitinUK for the swift grading of submitted posters. However, students suffered stress whenever technical problems prevented their assignments from being uploaded or displayed correctly. In addition, since TurnitinUK's anonymous marking function renders document-embedded links unclickable, references had to replace links, thus diminishing the value of the electronic format.

It was therefore decided that the poster should instead be a formative, peer-reviewed and peer-marked exercise, using the Moodle Workshop tool. The students uploaded their assignments, which were then assigned to five other students for online marking – on personal electronic devices – within seminar time, using the rubric provided and allowing for free-text final comments. Prior to this peer-marking exercise, the lecturer led class discussion about assessment and feedback on the basis of the REAP principles (REAP project, 2010). The exercise itself was designed in accordance with 'Seven good practices for undergraduate education' (Chickering and Gamson,1987): it encouraged in- and out-of-class contact between students and lecturers, developed reciprocity and cooperation among students, used active learning techniques, gave prompt feedback (within forty-eight hours of hand-in), emphasised time on task and respected diverse talents and ways of learning (particularly as it was a creative exercise, unusual in a law degree). Students also expressed amazement at and respect for the best submissions, which communicated high expectations for the course.

There were some problems: the Moodle workshop tool is quite complicated for the lecturer to set up correctly, so careful attention to detail is required throughout; not all students participated (they failed either to upload a poster or to attend the assessment seminar); students using phones as marking devices found the rubric difficult to access; the lecturer had to mark some posters whose assigned students had not done so; a small number of posters did not upload correctly (usually on account of student inability to follow advice about acceptable file formats) to the disappointment of the students concerned. Improvements in response to these initial challenges will, next year, include: an in-class opportunity for the lecturer to discuss each poster with its author and provide oral feedback; an invitation to

students to email to the lecturer any posters which fail to display correctly, so that feedback may still be acquired. Nevertheless, in spite of such difficulties, this was a largely successful change, retaining the learning outcomes of the original assessment while reducing stress and adding the chance of experiencing peer marking.

2. The January exam

The second change was from the seen written exam in January to a seen online assessment. Both assessments test all the material taught in the first term, including the topic covered in the formative poster assignment.

The assignment consists of twenty questions, a mix of multiple choice (MCQs), extended matching and ordering questions, created using the Moodle quiz tool. They are based upon a register of title document, which is available to students before the Christmas break, as are the questions asked (but not the answer options). Students can seek guidance about the assessment on a dedicated Moodle forum.

Students take the assessment unsupervised during a period of eight hours. Once they begin, they are timed and cannot restart. Questions and options within questions are shuffled randomly to make collusion more difficult – although it is not impossible. An improvement would be for the assignment to be taken under controlled conditions.

Professional online examinations in law, such as the Qualified Lawyers Transfer scheme, allow just under two minutes per question, so forty minutes were allowed for the test. The Moodle quiz tool – which allows extra time to be added for students, with reasonable adjustments for specific learning needs – proved straightforward to use. It is, however, important to create the questions in named question banks, before producing a quiz and adding questions to it. This facilitates the re-use of questions in later quizzes.

Research is available on the use of online testing in disciplines where understanding and problem-solving are required skills rather than, for example, accurate calculation (Fry *et al*., 2013). Several benefits have been identified, including: the ability to test a number of different topics within a shorter exam; the avoidance of the need for handwriting under pressure when students are more used to typing; automatic, unbiased marking which is easy and quick, no matter how large the cohort. There are also perceived drawbacks – students might pass by guessing the answer or working it out by spotting the relevant words without understanding the concepts (Deane and Bozin, 2017). Online exams also fail to test writing skills, which are essential to lawyers.

These concerns must be answered if the benefits of this type of assessment are to outweigh the difficulties. The answer lies, firstly, in using online assessment as one of a number of assessments on the course (writing skills are tested in the unchanged research coursework and end-of-year exam, for example). Secondly, problems such as guessing or recognising the answer without understanding it are best solved by appropriate question design, which is a significant challenge. MCQs, which form the majority of the questions, consist of three main parts – the stem, the lead in and the options, which latter consist of the key (best answer) and a number of distractors (less good / less correct answers).

The stem of a MCQ needs to be clear and avoid unnecessary detail. It should present a realistic, meaningful scenario which avoids ambiguity. It should test a key rule, not ‘nitpicky facts’ (Case and Donahue, 2008).

The lead-in should ideally be able to be answered by the student before the options are seen. A student who knows the legal rule should be able to apply it and reach an answer. Lead-ins to avoid include 'Which of the following is correct?' and, even worse, 'Which of the following is incorrect?'

The options should contain a clear key and a number of distractors which should be plausible and not too different in length and style from the key. Using correct technical vocabulary in the distractors minimises the likelihood of success by 'recognising without understanding'.

These requirements make setting questions difficult and time-consuming. However, the work can be spread over a longer period, rather than compressed into the fifteen-day marking limit. It is essential to involve colleagues in a thorough testing process. However, it is possible to exclude one question from the overall grade if it is later realised that it was unfair or unreliable. Moodle produces analytics which can be used to assess performance across the test as whole and within particular questions.

Overall, the changes to assessment in the course were successful. The students enjoyed the poster assessment and the online exam and appeared to work hard for both assignments. The results in the course were in line with those in previous years (mean grade 54% in 2015-16 and 56% in 2016-17) and there was good student satisfaction. There was no reduction in workload for the teaching team, but the work could be moved to less busy times of year, which made it less stressful. Lessons learnt from this first implementation of the changes will serve to refine future iterations.

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Helpful Resources

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