3 Embracing and reimagining technology-enhanced learning in public international law to Generation Z

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3 1 Introduction

The setting in which higher education teaching and learning takes place changed overnight as a result of the impact of Covid-19.[1] As in the case of other institutions, UP's Law Faculty of was prompted by the pandemic to convert from mainly face-to-face learning to emergency remote teaching (ERT),[2] or to fully online teaching practices.[3] This chapter reports on the

1 For a discussion of ERT during Covid, see *The Difference Between Emergency Remote Teaching and Online Learning* (2020); Bozkurt and Sharma "Emergency Remote Teaching in a Time of Global Crisis due to Coronavirus pandemic" 2020 *Asian Journal of Distance Education* i–vi; Kajiita, Nomngcoyiya and Kang'ethe "The 'Revolution' on Teaching and Learning: Implications of Covid-19 on Social Work Education in Institutions of Higher Learning in Africa" 2020 *African Journal of Social Work* 25–33; Bozkurt *et al* "A Global Outlook to the Interruption of Education due to Covid-19 Pandemic: Navigating in a Time of Uncertainty and Crisis" 2020 *Asian Journal of Distance Education* 1; Means, Bakia and Murphy *Learning Online: What Research Tells us About Whether, When and How* (2014); Crawford *et al* "Covid-19: 20 countries' Higher Education Intra-Period Digital Pedagogy Responses" 2020 *Journal of Applied Learning and Teaching* 1.

2 ERT is defined as a temporary shift of instructional delivery to an alternate delivery mode for crisis circumstances; see Hodges *et al* "The Difference Between Emergency Remote Teaching and Online Learning" *Educause* 2020 https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning (last accessed 2022-09-21).

3 "Fully online practices" is defined as a situation in which face-to-face lectures, without prior planning and preparation, are replaced by online facilitation of learning (instruction) only. It is noted that the University of Pretoria was in the position to

emergency shift in facilitating Public International Law (PBL 320), a third-year core module servicing between 550 and 650 students annually. In this context the chapter reflects on the response to the disruption in the practice of legal education resulting in fully online instruction and the re-imagination of how technology best can be employed to facilitate instruction in PBL 320. This contribution aims to answer the important query of whether the use of technological innovation compromised or enhanced the quality of presentation of the PBL 320 module and promoted student success.

Reimagining and embracing technological innovation is a response to a central driver in curriculum transformation called "renewal of pedagogy and classroom practices".[4] In this context of the renewal of pedagogy and "virtual" classroom practices, it was important to reflect on the response to the disruption in the practice of legal education, and specifically PBL 320, in order to reimagine how technology best can be employed to facilitate fully online instruction. The process of planning for the transition took place in alignment with the UP teaching and learning approach,[5] during the first semester of 2020 through the collaboration between the lecturers (as facilitators and planners),[6] and the academic staff developer.[7]

transition rather effortlessly as the technological infrastructure was in place as a hybrid approach to teaching had been encouraged already. The authors are cognisant that not all universities had the capital to supply students in need with laptops and data.

4 Curriculum transformation involves continuously rethinking and re-evaluating the ways in which we learn and teach. UP Faculty of Law "Curriculum Transformation Framework (S4466/17 – amended)" https://www.up.ac.za/faculty-of-law/article/2291240/curriculum-transformation-framework (last accessed 2022-09-21).

5 The UP's hybrid model that assumes three phases in teaching and learning, namely, preparation before class, engagement in class, and consolidation after class. UP Education Innovation Document Digital strategy for teaching, learning and student success – Department for Education Innovation (2020). See also UP Department of Education Innovation "Teach and Learn the UP Way" https://www.up.ac.za/media/shared/391/pdfs/teach-learn-up-way-2020.zp184675.pdf (last accessed 2021-11-27).

6 The 2020 team consisted of Dr Martha M Bradley (module coordinator); Professor Annelize Nienaber; Mr Marno Swart (assistant lecturer); Ms Jessie Phyffer (Academic Associate); Mr Felix le Roux and Mr Mbongeni Ncube (tutors). The 2021 team consisted of Dr Martha M Bradley (module coordinator); Ms Jessie Phyffer and Mr Marno Swart (assistant lecturers); Mr Felix le Roux (academic associate); and Mr Nicolaas J Nel (tutor). Ms Faith Mathibedi served as educational consultant and Mr Andre du Plessis as video producer and animator.

7 A professional developer was mandated, among others, to facilitate professional development interventions and support initiatives to develop expertise in teaching practice.

It is important to understand that moving teaching and learning online involves more than merely uploading files and video links to ClickUP.[8] The PBL 320 team sought to reimagine the new teaching space and its dynamics. The major challenge was twofold: first, "understanding how teaching and learning change when particular technologies are used'[9] and, second, how generation theory informs our choice of technologies during the process of facilitating changes to this module. Student interaction is another issue we considered in adapting teaching to online-facilitated instruction with Generation Z (or colloquially referred to as "Gen Z")[10] in mind.

Through a focus on the characteristics of student needs, which led to an increased use of diverse (technology) modalities that facilitate teaching online and the use of student support eco-systems, the PBL 320 team considered the specifics in the environment of the current cohort of students – Generation Z – including the influence of the demands raised by the nature of contemporary skills (21st century skills, 4IR, and so forth). This chapter addresses the following questions presented in sequence after this introduction: What contextual conditions and dynamics can be considered (part 2)? Which modalities (technology infrastructures) are to be used to enable a shift not only to ERT/online teaching but to excel at teaching and learning by embracing technology (part 3)? How can we, as a teaching team, adapt by learning from student responses to the transition of PBL 320 to move to fully online instruction when we return to the classroom (part 4)?

3 2 Contextual conditions and dynamics

Generation Z, a generally accepted description of the generation born between 1995 and 2010,[11] are digital natives that have grown up in an information-rich era.[12] They are a technology-savvy and highly connected generation who can and do quickly access a wealth of information

8 ClickUP is a customised name for the UP's learning management system, supported by Blackboard.

9 Harris, Mishra and Koehler "Teachers' Technological Pedagogical Content Knowledge and Learning Activity Types: Curriculum-Based Technology Integration Reframed" 2009 *Journal of Research on Technology in Education* 393.

10 Generation Z, a generally accepted description of the generation born between 1995 and 2010. Dolot "Characteristics of Generation Z" 2018 *E-mentor* 44–45.

11 As above.

12 Mohr and Mohr "Understanding Generation Z Students to Promote a Contemporary Learning Environment" 2017 *Journal on Empowering Teaching Excellence* 87–89; Cilliers "The Challenge of Teaching Generation Z" 2017 *International Journal of Social Sciences* 190.

through various mediums.[13] They grew up in the early 2000s, when now commonplace technologies such as the internet, smartphones and laptops were just emerging as central features of everyday life they are today.[14] As a result, Generation Z lives in, and prefers to function in, both the real and virtual world.[15] It is in this reality that most of our students, as Generation Z, function and for whom we as team sought to design our offering for PBL 320. This part highlights a few features of Generation Z and how the PBL 320 team designed its offering to accommodate these generational features. Also, it highlights the response of the team to the South African reality of unequal access to virtual spaces.

Before the PBL 320 offering was redesigned it had been designated as a high-impact module by UP. Modules with this designation have large enrolments and a high failure rate. In response, the 2020 team decided to adopt the University's approach to teaching and to separate learning into three phases – prepare, engage and consolidate. It was thought that a well-organised offering would appeal to Generation Z's self-identification as a well-organised generation.[16] Separating each lecture into these three independent but interrelated phases allowed students to plan their schedules and created a solid foundation at the outset which allowed the international law module, one that often is considered complex and "foreign" to law students, to play to the strengths of the character of Generation Z. In dealing with the Covid-19 pandemic and the consequent shift to ERT, the solid foundation of the offering provided by well-organised lectures became an indispensable part of the module in coping with a tumultuous time for students and lecturers. The PBL 320 team reacted by deciding to make learning easier rather than more difficult for Generation Z, which we did by appealing to the generation's affinity with technology.[17]

Several consequences arise out of and around rapid technological advances. One such consequence for Generation Z students is that they feel comfortable in a virtual world.[18] The team had to remain cognisant of the reality of an unequal South African society and of how inequality

13 Dolot 2018 *E-mentor* 45; Cilliers as above 190; Graham "Generation Z Goes to Law School: Teaching and Reviewing Law Students in the Post-Millennial Generation" 2018 *University of Arkansas as Little Rock Law Review* 50.

14 Dolot as above.

15 As above.

16 Dolot 2018 *E-mentor* 46.

17 As above 45.

18 As above.

plays out in the virtual world, specifically access to it.[19] The PBL 320 team nevertheless recognised the shift to ERT and online learning as offering an opportunity to venture into the virtual world as a way of meeting our students at their level. As such, our offering made use of short videos, longer animated videos, and a video game, all of which immersed our students in a virtual, yet still highly educational and authentic (or simulated) world of public international law content and the questions it poses. Using these tools appealed simultaneously to another feature of Generation Z – their preference for visual stimuli as a mode of learning.[20]

An additional feature of digital natives is that they prefer and seek out feedback and communication.[21] With this characteristic in mind the PBL 320 team designed short, computer-based quizzes for the students to complete after each lecture. The purpose of these quizzes was to allow them to test their knowledge of the content and to identify any gaps in their understanding of the content. As learning had been completely shifted to an online environment and because there were not as many opportunities for students and lecturers to communicate in person, these quizzes acted as feedback mechanisms for students. As for being able to communicate with students, weekly newsletters were sent to all students on Monday mornings. These newsletters contained all relevant information for the week, including the content to be covered during that week, what was expected of students and any other general announcements of which they should take note, such as upcoming tests or lecture consultation hours.[22] Students communicated to us that they found these newsletters particularly helpful and a key to their success in the module, with one student remarking: "The weekly newsletters were greatly appreciated as it set the tone for the week and provided clear instructions and information."

A final feature of Generation Z that influenced our teaching programme is the fact that they have shorter attention spans and struggle to sift through and sort out the valuable from the sea of information that

19 Of the South African population, 36 % does not have access to the internet, and only 1,2 % of the rural population (which makes up 32,4 % of the South African population) has internet access; see Briggs "Connectivity in South Africa: The Numbers You Need to Know" 2021-07-13 *ITWeb* https://itweb.africa/content/dgp45Ma6yKxqX9l8 (last accessed 2021-11-06).

20 Mohr and Mohr 2017 *Journal on Empowering Teaching Excellence* 92; Cilliers 2017 *International Journal of Social Sciences* 190–191; Graham 2018 *University of Arkansas as Little Rock Law Review* 82. It should be emphasised that at the University of Pretoria, the Disability Unit would transform visual media in an appropriate format in the event that a student is visually impaired. The PBL team did however ensure that audio options were available in the alternative to visual offerings.

21 Dolot 2018 *E-mentor* 46; Graham as above 71.

22 Examples of these newsletters are on file with the authors.

they have at their fingertips.[23] We considered this issue, as well as the fact that visual media are beneficial to advancing the understanding of Generation Z students,[24] and designed Powtoons (animated videos) for the "prepare" phase of learning. Powtoons are short, partly animated videos that provide students with the main points of the lectures that are covered in the "engage" phase. They are meant to highlight what information is important for the students in their upcoming lectures and to structure their note-making. The Powtoons combined almost all of Generation Z's preferred methods of learning and retained information in a short, but educational, visual medium. The educational value of Powtoons is discussed further below.

While the PBL 320 team took time in designing an offering in a way that complemented the strengths of Generation Z, we also had to take into consideration South African reality. As mentioned above, not all South Africans have equal access to the virtual world.[25] For those that do have access, this may not be constant access and may require both logistical and financial planning to be able to access online teaching.[26] We ensured that all of our course material (video content, audio content, and traditional course material such as readings and PowerPoint slides) was accessible via UP's zero-rated data system that it had coordinated with South African network service providers. We also ensured that all typically data-intensive media, such as videos, were converted into less data-intensive audio-formatted versions in which no educational value was lost. Where students had problems accessing these materials, we worked with them to find ways of giving them access and ensuring their success. We did what we could to ensure that no student was left behind as a result of unequal access to virtual spaces.

Technological pedagogical content knowledge (TPACK) was used as a lens during the process of implementing ERT in 2020.[27] The framework

23 Mohr and Mohr 2017 *Journal on Empowering Teaching Excellence* 87–89; Cilliers 2017 *International Journal of Social Sciences* 193; Graham 2018 *University of Arkansas as Little Rock Law Review* 52, 60.

24 See Graham as above 82, where the author states: "A well-chosen, meaningful visual can often work as a chunking technique that helps students process a large amount of information that would otherwise overwhelm them."

25 Briggs "Connectivity in South Africa: The Numbers You Need to Know" 2021-07-13 *ITWeb* https://itweb.africa/content/dgp45Ma6yKxqX9l8 (last accessed 2021-11-06).

26 As above.

27 TPACK "explicitly considers the role that knowledge about technology can play in effective teaching". It further "refers to knowledge about the complex relations among technology, pedagogy, and content that enable teachers to develop appropriate and context-specific teaching strategies". See Koehler, Mishra, Kereluik, Shin and Graham

facilitated the integration of content, pedagogy and technology of the PBL 320 module. During the planning phase we clarified the ERT situation to ourselves as a team, identified the challenges of facilitating PBL 320 fully online and developed action strategies. In the action phase we put those strategies into action; in the observation phase we analysed students' feedback and results; and, lastly, reflected on the processes and integration of the three knowledges of the framework – technology, pedagogy and content.

3 3 Generation Z and technological modalities employed

The rapid advances in technology have changed the way in which people learn and engage with material. In recognition that Generation Z spends much of their time online, we determined that education should offer access to multiple platforms using multiple media for learning, including traditional written work and videos. At the core of the design of our online offering we strive to meet our students on their level even though the focus is to deliver the relevant legal content. We highlight the fact that our teaching approach conforms to the UP-promoted method of teaching and learning designed to prepare our students for a future technology-based workplace and we follow the "prepare, engage and consolidate" approach.[28]

The TPACK framework articulated well with the ERT mode as it promoted the consideration of technological affordances and pedagogical knowledge in planning for the PBL 320 module. While the preparation, engagement and consolidating phases were already applied in this module, the phases became even more useful and practical when the world moved to ERT mode. This approach assumes three phases in the teaching and learning environment, namely, (a) preparation before a lecture; (b) engagement during a lecture; and (c) consolidation after a lecture.[29] The preparation before enabled student preparedness and/or afforded introduction to the content inducing prior knowledge to build on during the engage phase.[30] The latter and consolidate phases were now (in the ERT environment) replaced with students "engaging virtually"

"What is Technological Pedagogical Content Knowledge? (TPACK)" in Spector, Merrill, Elen and Bishop (eds) *Handbook of Research and Education Communications and Technology* (2014) 102.

28 See UP Department of Education Innovation "Teach and Learn the UP Way" https://www.up.ac.za/media/shared/391/pdfs/teach-learn-up-way-2020.zp184675.pdf (last accessed 2021-11-27).

29 As above.

30 As above.

with the content through diverse technological tools of which some will be explained below. The radical move to ERT forced the team to integrate the module's content with pedagogical and technological knowledge to produce an effective facilitation strategy. It was invaluable for the team to understand how teaching and learning change when particular technologies are used in the migration of the PBL 320 module to being facilitated fully in an online mode.[31]

We highlight three of these technological interventions: Powtoons, as an example of employing technology in the "prepare" phase; 3D and 2D partially and fully animated lectures/videos as an example of employing "chunked" content in the "engage" phase; and a computer game including the use of virtual escape rooms as examples in the "consolidation" phase – all of which illustrate the embracing of technology in facilitating PBL 320 during ERT.

3 3 1 Prepare phase: Powtoons

As mentioned above, one of the tools used by the PBL320 team to meet Generation Z on their level were Powtoons. These videos are employed in the "prepare" phase of each lecture because their design is perfectly suited for preparing students for content-heavy, complex lectures. This sub-section discusses what Powtoons are, why they are suited to Generation Z students and why they are effective learning tools.

Powtoons are short videos that can contain text, animated characters and props, and real images.[32] The PBL 320 team makes use of all these features and adds narrations as an extra element, thereby creating teaching mediums that are audio-visual.[33] Powtoons have several potential benefits,[34] but for our public international law students the purpose of the videos was to break down difficult information into smaller, organised pieces of information that allow students to structure their notes and process lesser

31 See, generally, Harris *et al* 2009 *Journal of Research on Technology in Education* 393.

32 Adnyani, Suprianti, Marsakawati and Narotama "Powtoon as the Implementation of Edutainment for Young Learners" 2021 *Advances in Social Science, Education and Humanities Research* 204, 205.

33 This is one of the potential benefits of Powtoons as described by Adnyani *et al* as above 205.

34 Six of these are listed in Adnyani as above 205.

amounts of information.[35] The fact that the videos are no longer than five minutes caters to the short attention span of Generation Z.[36]

Even though the videos are short and meant to cater to limited attention spans, employing multiple intelligences and connecting images with concepts and ideas can improve long-term memory retention.[37] Powtoons are able to meet Generation Z on their level while having immense educational value. Using Powtoons as an educational medium can help overcome any difficulty students might have with traditional delivery methods,[38] as well as help them learn independently, and better prepare to identify important concepts in the "engage" phase of the lecture.[39] The student feedback on the use of Powtoons as an educational tool in the "prepare" phase of the lecture has been positive. One student even remarked: "The Powtoons, which were used as prepare part of the material, were always beneficial and acted as a good revision tool before the semester tests." Another student considered the Powtoons educational and fun, stating, "One of my favourite features were the Powtoons, as they give you a foundation of the material you are about to study and they give you a general idea of what the theme is about, and they were fun to watch!"

The benefits of using Powtoons to teach Generation Z are clear. Employing multiple intelligences in short, yet visually stimulating videos is perfect for the digital natives' learning style and also is an effective tool for long-term memory retention. They are effective in educating and entertaining students[40] which helps break the monotony of traditional learning and can help break down complicated content. The PBL 320

35 Another potential benefit of Powtoons is the synthesising of information that allows students to achieve greater understanding of the information; see Adnyani *et al* as above 205.

36 Graham 2018 *University of Arkansas as Little Rock Law Review* 52.

37 Steffes and Duverger "Edutainment With Videos and its Positive Effect on Long Term Memory" 2012 *Journal for Advancement of Marketing Education* 3; Puspitarini, Akhyar and Djono "Developing Powtoon-based Video Learning Media for Five Grade Students of Elementary School" 2018 *Advances in Social Science, Education and Humanities Research* 173.

38 Puspitarini *et al* as above 173.

39 Herwati, Sulisworo and Fayanto "The Development of Learning Videos on PowToon-based Work and Energy Topics to Support Flipped Classroom Learning" 2019 *Journal of Research and Method Education* 55.

40 Steffes and Duverger 2012 *Journal for Advancement of Marketing Education* 1.

team has found that Powtoons are among the best audio-visual tool to use to help "prepare" Generation Z students for their lectures.

3 3 2 Engage phase: Videos

The engage phase concerns the formal lectures that before Covid took place via face-to-face contact sessions.[41] The PBL 320 team made use of various videos in the "engage" phase of lectures. These videos included formal recordings of the lecturer presenting the work, interviews with esteemed experts, and 3D and 2D partially and fully animated videos. The part that follows explains the value of these videos with reference to the concepts of cognitive load, learner control, and learning efficiency.

3 3 2 1 Cognitive load

The cognitive load theory postulates that the storage of information into long-term memory requires the processing of that information from sensory memory to working memory.[42] However, since the capacity of working memory is very limited, it is crucial that the working memory receives signals or cues to indicate which information it should receive, process and commit to long-term memory.[43] Videos provide a unique opportunity to reduce the cognitive load of students and to help them commit important information to long-term memory instead of temporarily memorising large volumes of information (also known as "cramming"/"parrot learning"/rote memorisation). To this end, videos should be as short as possible or divided into several segments and each video should be focused on a specific learning outcome.[44] This focus is even more important if one considers the generally short attention span of Generation Z students.[45] These principles guided the PBL 320 team in the design of videos for lectures. The help of Andre du Plessis, a senior video director at UP with extensive experience in video production, was enlisted to ensure that lecture videos were thoroughly edited. Thus, the videos contained only the most relevant and necessary information and on-screen graphics were used to signal important information. The lecturer

41 UP Department of Education Innovation "Teach and Learn the UP Way" 3–4 https://www.up.ac.za/media/shared/391/pdfs/teach-learn-up-way-2020.zp184675.pdf (last accessed 2021-11-27).

42 Brame "Effective educational videos: Principles and Guidelines for Maximising Student Learning From Video Content" 2016 *CBE—Life Sciences Education* 1–2.

43 Brame as above 2.

44 Fyfield, Henderson, Heinrich and Redmond "Videos in Higher Education: Making the Most of a Good Thing" 2019 *Australasian Journal of Educational Technology* 2.

45 Graham 2018 *University of Arkansas as Little Rock Law Review* 52.

also highlighted the learning outcome at the start and end of each lecture to ensure clarity on the most important aspects of the course content.

The use of 3D and 2D partially and fully animated videos was a particularly useful and exciting innovation employed by the PBL 320 team. These videos maximise working memory capacity by fully engaging the visual and auditory pathways for information processing.[46] For example, a fully animated video was used to illustrate and explain some of most the complex topics in international air law. The video used 3D animation to depict the different scenarios that could result from a commercial airplane making an unauthorised journey through another state's airspace and explained the lawfulness of the actions of the state in each scenario. Another example was the use of a partially animated lecture to explain the different maritime times under the international law of the sea – an abstract concept that usually is very difficult to understand through text only. These examples show that videos have the potential to make even the most daunting and difficult concepts easily understandable in a way that text rarely is capable of doing.[47] As Isabel Vieira, Ana Lopes and Filomena Soares note, "a moving image can help someone to see a process or realise how something works, moves, or performs".[48] Students appreciated these animated videos, with one remarking that, "The animated lectures made it easier to visualise the work in areas where it would otherwise be difficult to understand." With animation, "problem-based scenarios can be brought to life" in a way that is both educational and enjoyable to students.[49] Video lectures, especially those that utilise 3D or 2D animation, also have the benefit of stimulating different parts of the brain and accommodating multiple learning styles at once. The combination of visual and auditory learning material in multimedia formats such as video has been shown to increase memory, comprehension, understanding, and learning.[50]

46 Brame 2016 *CBE—Life Sciences Education* 2.

47 Bravo, Amante, Simo, Enache and Fernandez "Video as a New Teaching Tool to Increase Student Motivation" 2011 *IEEE Global Engineering Education Conference (EDUCON)* 638, 640.

48 Vieira, Lopes and Soares "The Potential Benefits of Using Videos in Higher Education" Proceedings of EDULEARN14 Conference 2019-08-07, Barcelona, Spain 750 https://recipp.ipp.pt/bitstream/10400.22/4853/1/THE POTENTIAL BENEFITS OF USING VIDEOS IN HIGHER EDUCATION_1166.pdf (last accessed 2022-09-30).

49 Colbran, Gilding and Colbran "Animation and Multiple-Choice Questions as a Formative Feedback Tool for legal education" 2017 *The Law Teacher* 252.

50 Steffes and Duverger 2012 *Journal for Advancement of Marketing Education* 2.

3 3 2 2 Learner control

The use of videos in higher education places the learning process largely under the control of the student.[51] Students can access videos at anytime and anywhere, videos can be re-watched as many times as needed, and videos can be paused and rewound where necessary. This aspect of learner control has various benefits. Since there is flexibility in the time when videos are accessed, issues related to transport, internet access, and other personal circumstances are less disadvantaging than in other modes of teaching and learning. Furthermore, the fact that students can pause or rewind videos means that they can learn at their own pace and re-watch parts that are unclear or require revision. Rather than having to adapt to the teaching style and pace of the lecturer, students can work through the lecture in a way that suits their individual needs.

It would appear that the most significant benefit of learner control is that it encourages and develops autonomous learning, which is a crucial skill in the legal profession and any other professional occupation.[52] The use of videos in higher education entails not only learner *control* over the learning process but also learner *responsibility* in the learning process. The lecturer still provides guidance and fulfils the role of teaching the course content, but students assume the responsibility to work and learn independently, which is what will be expected of them when they enter the professional world. Thus, apart from being valuable tools in the teaching of the course content, videos contribute to the training of competent graduates that can learn autonomously after the completion of their studies. The development of autonomous learning also aligns with the general trend to engage in flipped learning – a mode of teaching that entails the facilitation of learning outside the classroom to make more time for collaborative activities in class time.[53]

3 3 2 3 Learning efficiency

Videos that are short, concise and focused make the learning process more efficient for several reasons. First, Generation Z students, who have encountered evolving technologies throughout their lives, are very comfortable using videos as part of the learning process.[54] Streaming

51 Fyfield *et al* 2019 *Australasian Journal of Educational Technology* 3; Bravo *et al* 2011 *IEEE Global Engineering Education Conference (EDUCON)* 640.

52 Bravo *et al* as above 641.

53 Fyfield *et al* 2019 *Australasian Journal of Educational Technology* 3.

54 Rackaway "Video Killed the Textbook Star? Use of Multimedia Supplements to Enhance Student Learning" 2012 *Journal of Political Science Education* 190; Vieira *et al* 750

platforms such as YouTube and Netflix, as well as social media platforms such as Instagram and Facebook are omnipresent in the lives of contemporary students and thus the use of videos in higher education provides a sense of familiarity that facilitates the learning process. Second, videos are often valuable at clarifying what is expected of students in the learning process. For example, the PBL 320 team recorded short videos (one to two minutes) at the start of each week explaining how students should approach the week's lectures and which tasks they had to complete. The number of queries and concerns regarding the course decreased dramatically following the implementation of these "approach to the week" (weekly plan) videos. Edna Bravo, Beatriz Amante, Pep Simo, Mihaela Enache and Vicenc Fernandez *et al* similarly observed that "the use of video prior to the class session generated fewer doubts from students".[55] Third, videos have been shown to increase student motivation and engagement.[56] Students are more motivated to study difficult concepts and are more willing to meaningfully engage with the course content if it is presented in an exciting format with which they are familiar and are able to understand. Videos, especially those that include 3D and 2D animation, capture the attention and even imagination of students in a way that text is rarely able to do. The addition of short consolidation activities such as multiple-choice questions to be completed after watching the video lectures further enhances student motivation and engagement since students receive immediate feedback on their progress in the learning process.[57] The PBL 320 team utilised short computer-based tests (CBTs) as a mode of formative assessment to assist students in reaching the learning outcomes of each part of the course. Fourth, videos offer a unique opportunity to include the insights of leading scholars and experts on the subject matter.[58] For example, the PBL 320 team included recordings of interviews conducted by the lecturers with world-famous international lawyer, Professor Dire Tladi, as part of the course content. These videos offer students the chance to see and hear experts discussing the concepts about which they are learning– an experience that often is more engaging than reading a journal article by the expert concerned.

https://recipp.ipp.pt/bitstream/10400.22/4853/1/THE POTENTIAL BENEFITS OF USING VIDEOS IN HIGHER EDUCATION_1166.pdf (last accessed 2022-09-30); Bravo *et al* 2011 *IEEE Global Engineering Education Conference (EDUCON)* 638.

55 Bravo *et al* as above 640.

56 Brame 2016 *CBE—Life Sciences Education* 4–5; Colbran *et al* 2017 *The Law Teacher* 250; Bravo *et al* as above 638.

57 Colbran *et al* as above 253–254.

58 Bravo *et al* 2011 *IEEE Global Engineering Education Conference (EDUCON)* 639.

3 3 2 4 Conclusion

From the above it may be concluded that videos, when used correctly, are valuable tools in the teaching and learning process. They reduce the cognitive load of students, deliver a measure of control over the learning process to the student and make the learning process more efficient. On videos as educational tools, one student remarked: "I enjoyed listening to/watching the lecture videos and found that I retained the information well." It is submitted that the advent of videos in higher education is a positive development that should be embraced by both lecturers and students.

3 3 3 Consolidate phase

The consolidation phase is the final phase of the UP way of learning.[59] The PBL 320 team employs continuous assessment in this phase to complement the preparation and engagement phases. The 2022 UP "Way of learning" document states:

> Alternative authentic forms of assessment (suitable to gather evidence about students' achievement of a particular module's outcomes) should be carefully considered. Some competencies could be measured effectively with technology. This becomes even more important at a university that has large class sizes like UP. Whichever format the assessment takes, the problems posed have to address the creative problem-solving skills students will need to thrive in the future. Assignments and assessments after class provide further opportunities for students to consolidate their knowledge and organise it into meaningful hierarchical patterns.[60]

To address this phase of learning, the PBL team made use of traditional quizzes in the form of CBTs, but we also introduced a computer game and an escape room.

3 3 4 Computer game

This part of the contribution aims to promote a better understanding of the benefits of gaming in higher education. In order to achieve this objective, the authors will first introduce our game *Saving Calisto: Two Presidents and a Grudge*, then motivate the benefits of gaming according

59 UP Department of Education Innovation "Teach and Learn the UP Way" 4–7 https://www.up.ac.za/media/shared/391/pdfs/teach-learn-up-way-2020.zp184675.pdf (last accessed 2021-11-27).

60 As above 5–6.

to gamification theory in general. Thereafter, we turn more specifically to how our student body, predominantly made up of Generation Z, benefits from our game. We do this through the lens of gamification theory and generational theory.

In 2020 the PBL 320 team scripted, produced and piloted the computer game *Saving Calisto: Two Presidents and a Grudge* with the assistance of Dennis Kriel of the Department for Education Innovation as lead animation designer. The game was intended to be part of the "consolidation" phase of our online offering and was designed specifically to place the students in the position of a legal advisor in order to assess their understanding of the work covered in the "engage" phase of the lecture as well as to introduce them to the reality of what they might experience in the workplace. The student adopts the role of an advisor to a newly elected woman president who is faced with a potential biochemical attack by an opposing state with which her country has a strained history. The entire story takes place in a war room and the characters are designed to represent people usually found in such a room.

The reasons for selecting a video game to form part of our consolidation phase as a mode of self-assessment was inspired by the literature on the benefits of gamification theory and digital game-based learning theory in teaching,[61] in combination with generation theory. The benefits, which will be discussed in this part of the chapter, complement the way in which students of Generation Z learn.[62] At this point, it is beneficial to discuss some core gamification definitions that will be employed by the authors below. According to Ilaria Caponetto, Jeffrey Earp and Michela Ott the term "gamification" means the application of gaming elements in a non-gaming environment to enhance the experience of those involved in the gaming.[63] "Digital game-based learning theory" is promoted as a theory that underscores the value of employing digital games for educational purposes rather than using mere stand-alone applications.[64] The PBL 320 computer game qualifies as a "serious game". "Serious games" are the

61 Brougère Jeu et Education (1995); Egenfeldt-Nielsen, Meyer and Sorensen *Serious Games in Education – A Global Perspective* (2011); Aldrich *Learning by Doing: A Comprehensive Guide To Simulations, Computer Games, and Pedagogy in e-Learning and other Educational Experiences* (2005); Connolly, Boyle, MacArthur, Hainey and Boyle "A Systematic Literature Review of Empirical Evidence on Computer Games and Serious Games" 2012 *Computers and Education* 661.

62 See part 2 of this chapter for insight into the learning preferences of Generation Z and generational theory.

63 Caponetto, Earp and Ott "Gamification and Education: A Literature Review" 2014 *European Conference on Games Based Learning* 50.

64 Egenfeldt-Nielsen *et al* (2011).

category of computer games that have entertainment characteristics but are purposefully built for education or training.[65]

Brianno Coller and David Shernoff make the case for the suitability of video games in higher education.[66] These scholars highlight the importance of engagement in learning.[67] Coller and Shernoff motivate the argument that video games should be approached as a distinct mode of conveying information,[68] as opposed to mainstream educational media such as books and videos, because of the increased level of interactivity.[69] Richard van Eck also reflects on engagement as an advantage of gamification.[70] He points out that the reason why games can be effective learning tools is not simply because of what games are, but also because of what specific games embody and what learners are actively doing when playing the game.[71]

The authors will highlight the benefits that were particularly appealing to the PBL 320 team when designing and developing *Saving Calisto*. The narrative of *Saving Calisto* is designed to be educational, engaging and somewhat relatable to ensure that students remain captivated by the developments in the game without losing the point of the educational goal. A major challenge lecturers face is getting students to engage with the subject matter in order to deepen their understanding and highlight how the knowledge they acquired can be applied. This game was designed in response to this challenge and the gaming format catered to this as simulation games offer an excellent opportunity to heighten engagement and achieve these goals.[72] These aims are achieved partially by allowing the students to fail to enable them to learn from their mistakes.[73] The game also makes learning fun by incorporating emotions and elements such as surprise.

65 Younis and Loh "Integrating Serious Games in Higher Education Programmes" paper presented at Academic Colloquium 2010 https://www.researchgate.net/publication/236975228_Integrating_serious_games_in_higher_education_programs (last accessed 2022-09-30).

66 Coller and Shernoff "Video Game-Based Education in Mechanical Engineering: A Look at Student Engagement" 2009 *International Journal of Engineering Education* 308.

67 As above.

68 As above.

69 As above.

70 Van Eck "Digital Game-Based Learning: It's not Just the Digital Natives who are Restless" 2006 *EDUCAUSE Review* 16.

71 As above.

72 Ding, Guan and Yi "Game-Based Learning in Tertiary Education: A New Learning Experience for the Generation" 2017 *International Journal of Information and Education Technology* 148, 149.

73 As above.

Caponetto *et al* explain that game play has a multitude of benefits, not least in that it helps inspire students to engage with the work.[74] Incorporating gaming into the learning process sparks the interest of students and prompts them to engage in a new, but also somewhat familiar way, with work that they may perceive as tedious or complex.[75] Gaming ultimately makes learning more attractive, captivating and effective.[76] Game play also offers a creative online environment in which students can be prepared for the future workplace that increasingly makes use of technology.[77] Students belonging to Generation Z are likely to work in technology-filled workplaces; therefore we must match their probable experience to less traditional teaching approaches.

Gábor Bíró points out that one of the benefits of gamification as a learning theory is that gamification facilitates diverse learning paths.[78] The PBL 320 game incorporates diverse learning paths by not only including main objectives or goals in the form of questions at the end of each level, but also incorporating smaller goals (questions) throughout the level that influence the pathway taken by the student in the game. As discussed in part two of this contribution, the authors are cognisant of the learning preferences of Generation Z who make up a large portion of our student body, and gamification theory supports and offers a different medium to be employed in the consolidation phase apart from quizzes. The shorter attention spans of Generation Z[79] are appealed to through the game by including smaller goals (questions) that students must answer before they can reach the end of the level where they are faced with the main goal (question) of the level.

Dividing the game into smaller units not only keeps students engaged and therefore motivated but also acts as positive reinforcement and builds confidence.[80] Similar to Bíró, Karl Kapp considers the essence of gamification as not being rooted in the technology employed, but rather in the diverse learning environment in combination with "the system of decisions and rewards all aimed to increase motivation and reach higher

74 Caponetto *et al* 2014 *European Conference on Games Based Learning*.

75 As above.

76 As above.

77 Ding *et al* 2017 *International Journal of Information and Education Technology* 148.

78 Bíró "Didactics 2.0: A Pedagogical Analysis of Gamification Theory From a Comparative Perspective with a Special View to the Components of Learning" 2014 *Procedia-Social and Behavioral Sciences* 149.

79 As above; Graham 2018 *University of Arkansas as Little Rock Law Review* 52.

80 Bíró 2014 *Procedia-Social and Behavioral Sciences* 149.

levels of engagement in the learning process".[81] Van Eck shares this sentiment and argues that games are effective because of what students learn as they play the game.[82]

An added benefit of gameplay that we have incorporated into our game is that the can be designed to develop the critical thinking skills.[83] Christopher Cheong, Justin Filippou and France Cheong argue that gaming helps students develop problem solving and higher-order thinking skills and thus equips them better for their future workplace.[84] As Laura Graham points out, the constant use of smartphones by members of the Generation Z cohort impairs their critical thinking skills.[85] Elias Aboujaoude states:

> The more we become used to just sound bites and tweets the less patient we will be with more complex, more meaningful information … we might lose the ability to analyze things with any depth and nuance.[86]

Our game was designed to work with Generation Z and their short attention span, but it was also designed to encourage and develop critical thinking skills, as demonstrated below.

We wanted to show that these two ideas can coexist. By way of an example, the overall theme of the game is the use of force in international law and all questions in the game address this theme in some way. One scenario places the student in the position of deciding whether an issue should be solved through diplomatic channels or whether it is appropriate to use force instead. This situation forces the student to engage with the law of the use of force and to consider when it is appropriate to use force or when diplomatic channels are the more appropriate option. A failure to think about and critically apply the law results in the student losing the game. In real life such a failure can result in thousands of deaths and international liability. As such, although the game is in a highly visual

81 Kapp *The Gamification of Learning and Instruction Fieldbook: Ideas Into Practice* (2013), cited by Bíró as above 150.

82 Van Eck 2006 *EDUCAUSE Review* 16.

83 Cheong, Filippou and Cheong "Towards the Gamification of Learning: Investigating Student Perceptions of Game Elements" 2014 *Journal of Information Systems Education* 233.

84 As above.

85 Graham 2018 *University of Arkansas as Little Rock Law Review* 29.

86 As cited by Brouillette *Arts Integration in Diverse K–5 Classrooms: Cultivating Literacy Skills and Conceptual Understanding* (2019) 62.

medium that does not demand much attention from students; they still are required to think critically about their answers.

Serious games promote situated cognition.[87] The principle of situated cognition provides that learning that occurs in "relevant" and meaningful context is more effective than learning occurring outside such a context.[88] Returning to the above example, the use of force was chosen as a theme because of its continued relevance in international law and in real life owing to the reality of political tensions potentially boiling over into an armed conflict.[89] Our game placed students in a "war room" specifically designed to mirror an actual situation in which a president has to decide between going to war or not. The entire game unfolds in this war room. Grounding the game in this room and context was a deliberate choice taken in order to make it more realistic and, thus, meaningful. Losing the game can lead to the loss of thousands of lives because of an unjustifiable war. Virtual lives are at risk, but the hope is that if students are ever placed in a similar situation in their future workplaces, they will be able to recognise that real lives are at stake. Serious games, therefore, are effective because learning takes place in a meaningful learning environment (the game) where learning is both simulated, applied and practised.[90]

The use of gaming is not novel in education,[91] but this initiative is a first for the PBL 320 team. Designing a game that was able to appeal to Generation Z and play to their strengths while ensuring that it has educational value was a valuable experience for the PBL 320 team. We aim to learn from the experience and to employ gaming in our future approach to hybrid teaching and technology. In future, we aim to develop the game to be used as a formal assessment method.

3 3 4 1 Escape room

The use of escape rooms in higher education has been shown to significantly increase student motivation and engagement.[92] Furthermore,

87 Van Eck 2006 *EDUCAUSE Review* 4.

88 As above.

89 For example, Iran and the United States of America came very close to a war in January 2020 when the latter country killed the Iranian general Qasem Soleimani in a drone strike; see "Qasem Soleimani: Strike was to "stop war", says Trump" *BBC News* 2020-01-04 https://www.bbc.com/news/world-middle-east-50989745 (last accessed 2021-11-07).

90 Van Eck 2006 EDUCAUSE Review 4.

91 As above. See also Cheong *et al* 2014 *Journal of Information Systems Education*; Kapp (2013).

92 Adams, Burger, Crawford and Setter "Can you Escape? Creating an Escape Room

students seem to appreciate the educational value of escape rooms and tend to find completing escape rooms more enjoyable than traditional classroom exercises.[93] With this in mind, the PBL 320 team used an escape room as a form of assessment for the first time in 2021. Since all teaching and learning activities took place online under ERT, the escape room was virtual. The escape room was assigned as the consolidation activity at the end of the lecture on statehood and jurisdiction. It was built in Google Forms, a free application available online.

Several principles guided the design of the escape room. First, it is crucial for escape rooms to have an engaging narrative that grabs the student's attention.[94] The escape room used in PBL 320 challenged the student to find six gems in mysterious locations in order to escape and the student would receive a gem upon answering a question correctly. Second, students received sufficient guidance to ensure that they understand how to navigate the escape room.[95] Since the input and processing of answers in Google Forms is case sensitive, the PBL 320 team included very specific instructions to each question, for example, that answers should be typed, all in capital letters and that students should be aware of spelling answers correctly. This avoided the potentially frustrating situation where a student types the correct answer but is unable to proceed because of a spelling error or a difference in fonts used (upper case). Third, escape rooms should ideally follow a fixed sequence whereby solving a puzzle unlocks the next one.[96]

The escape room in PBL 320 consisted of several sections (referred to as levels) – each containing a piece of narrative followed by a question that needed to be answered correctly to unlock the next section. If students answered a question incorrectly, the response validation function in Google Forms provided feedback. Fourth, the difficulty level of the escape room needs to strike a balance between challenging the student and not causing excessive frustration or stress.[97] To this end, the PBL 320 team ensured that the questions were challenging on an intellectual level but that the answers were not longer than a single word. Students enjoyed

to Facilitate Active Learning" 2018 *Journal for Nurses in Professional Development* E1; López-Pernas, Gordillo, Barra and Quemada "Examining the Use of an Educational Escape Room for Teaching Programming in a Higher Education Setting" (2019) 7 *IEEE Access* 31735.

93 Adams *et al* as above E4–E5; López-Pernas *et al* as above 31725.

94 López-Pernas *et al* as above 31724.

95 As above 31732.

96 As above 31733.

97 As above 31724–31725.

this method of consolidation and encouraged creating more in the future, with one student remarking, the "escape room was so amazing. I think it should be done more often".

In summary, the inclusion of escape rooms in higher education offers an opportunity to assess students in a way that is enjoyable and engaging. The experience of the PBL 320 team has shown that escape rooms can be employed effectively during ERT since they can be built and operated online at no extra cost.

The choice of technology in each of the phases of prepare, engage and consolidate proved to be effective to accommodate, reach and engage with Generation Z.

3 4 Lessons learnt and looking to the future

In conclusion we reflect on lessons learnt, sharing our success rate and looking to the future. Covid-19 forced us to examine our beliefs and practices about facilitating PBL 320 fully online and influenced the choices of the technological tools we used as the team engaged in reflexive activities in facilitating in the ERT environment. The technology used was chosen to fit the specific content and context to make it accessible. The integration of technology, pedagogy and content knowledge confirmed the three central themes identified in the existing TPACK literature base.[98] The first theme is teaching strategies/methods;[99] in PBL 320 this includes Powtoons, 2D and 3D videos (animations), games, micro-learnings, narrated PowerPoints, YouTube videos and audio content (MP3/4). The second theme is content representations,[100] the mentioned technological affordances were useful to chunk the learning material. In addition, animations aroused interest, simulations stimulated interest through authentic incident replays, a range of modalities increased understanding and enhanced learning through the use of multiple senses (visual, auditory and verbal learning materials), which in turn enhanced conceptual understandings. The third theme is student knowledge[101] – while knowledge of content-specific understanding is an implicit part of both technological and activity structures, the integration of TPACK has supported student engagement, explanations of difficult concepts, scaffolding and making connections, bringing complex case law facts into reality, simplifying abstract principles comprehending abstract

98 Koehler *et al* (2014)

99 As above 108.

100 As above.

101 As above.

international law principles and, it would, enhancing retention. The delivery methods that were adopted successfully neutralised the disruptive nature of Covid-19 as evidenced by a historically high throughput rate as well as positive student evaluations. The paradigm shift from ERT to embracing and re-imagining technology in teaching PBL 320 has resulted in transforming a former high-impact module into a "student favourite" and to producing a greatly improved student success rate.[102]

Reflecting on whether or not the introduction of technological innovation compromised or enhanced the PBL 320 curriculum by improving the learning experience of Generation Z, the authors of this contribution are of the opinion that it enriched our offering and we propose the further use of those innovations that proved successful in developing a hybrid approach. However, contact sessions remain important. As the PBL 320 team look to the future and the hope of resurrecting our lecture halls once herd immunity has been gained, we will keep the technological assistance but will merge what currently is in the "prepare" and "engage" phases into the "prepare" phase. Contact sessions should be employed to engage students in consolidating the content by encouraging interrogation of the content and provoking debate by questioning and by engaging students to meet the challenges raised by the subject matter. We are further challenged to design for the development of higher order thinking skills and student collaboration activities.

In conclusion, the PBL 320 team took steps to understand who we were teaching and the context in which we were teaching. We understood that ERT unexpectedly was thrust upon our students just as it was on us, and we adopted an approach that allowed us to work with our Generation Z students rather than against them. We recognised that they appreciated feedback, communication and organisation, and that they suffer from short attention spans that appreciate visual mediums and organised information. We also recognised that not all students in South Africa have equal access to the virtual space, and we did what we could to ensure that no student was left behind. One student remarked:

> From all of my modules, the PBL 320 team provided the best platform for learning and engagement. The entire layout of the module made it incredibly easy to track my progress to keep up to date or catch up when necessary. The

102 Of the 634 students who were enrolled for the examination of 2020, 623 passed. This should be compared to 2019, when 571 students were enrolled for the examination and 470 students passed.

> entire system simply worked excellently and I truly think this module should set the standard for online teaching and learning.

This comment is evidence that the team is on the right track and that all the interventions discussed in this chapter are achieving what they are meant to. Our efforts were not in vain as they culminated in PBL 320 achieving its highest pass rate to date and promoting it from the list of UP high-impact modules.[103]

103 As above.