

REDESIGNING FORMATIVE ASSIGNMENTS TO INCREASE STUDENT ENGAGEMENT BLENDED LEARNING ENVIRONMENT

Olga Ustinova, Barnaby Pace, and Yury Zhukov

ABSTRACT

In 2020 COVID-19 and continuous lockdowns rapidly increased tertiary educational organisations' interest in online education and student engagement techniques that effectively work for both blended and online delivery modes. Organisations that used to rely heavily on face-to-face delivery started experimenting with activities in their learning management systems to adapt their education methodology to the new realities, and Otago Polytechnic Auckland International Campus was among them. The learning management system used by the organisation to engage with students online was Moodle, which made it the platform of choice for experiments in educational design.

This pilot study examined the use of conditional access to formative activities set up in Moodle as a method of gamifying the course and increasing student engagement. The course selected was Leadership in Action, an elective undergraduate course in the Bachelor of Applied Management undertaken approximately halfway through their three-year programme. The number of activities and resources was significantly reduced and structured into weekly blocks and the students were required to complete the activities in one block to access the next one. Findings indicated that making access conditional on activity completion proves to be an effective technique for improving students' participation. However, it runs the risk of increased anxiety levels in both the students and lecturers beyond the regular levels as the course progresses. The article discusses the pilot study from the perspectives of the Moodle administrator and the course lecturer to provide an implementation roadmap and a holistic reflection on the outcomes.

INTRODUCTION

Since the early 1990s, educational organisations have used different Learning Management Systems (LMSs) such as Moodle, Blackboard, Canvas, etc. to set online courses and ensure students' access to digital materials (Kim et al., 2019). The use of these LMSs has experienced enormous growth since the global COVID-19 pandemic drastically affecting and transforming the way education has been traditionally functioning and led to the biggest "online movement" in the history of education (Li & Lalani, pg. X., 2020).

The reasons for the rapid growth in online education are closely related to the digital transition of other traditionally analogue activities (Anderson & Rainie, 2015; Kim et al., 2019). Just like with other digital tools, online education platforms allow access to courses remotely and at a time when it fits a learner's schedule. (Alves, et al., 2012). Flexibility and convenience are the two factors that have the greatest impact on learners' decisions between traditional and online education (Bouchrika, 2020). This necessitates the inclusion of innovative ways to deliver materials and to interact and collaborate with learners in a digital environment both in real-time and asynchronously so that students and lecturers maximise the benefits of the system (Guo et al., 2018). But the issue of motivating and engaging the students through educational tools remains as critical online as it has always been with analogue education. Lecturers noted that it might

be more challenging to engage students, check their progress and understanding in a virtual learning environment (Kandri, 2020).

Otago Polytechnic Auckland International Campus (OPAIC) delivers its educational programmes through a blended learning model that combines face-to-face learning (substituted by online lectures during COVID-19 lockdowns), online learning, authentic work experiences, and student-managed learning (Otago Polytechnic, 2017). The LMS of choice in the tertiary educational organisation (TEO) is Moodle, a free open-source platform enhanced with specialised and targeted add-ons.

Online learning in OPAIC is conducted as a mix of synchronous (real-time lectures in a virtual space) and asynchronous learning (student-managed interaction with online course content when it fits their schedule) (Zhukov & Dai, 2020). Moodle is the main electronic resource for students to engage with learning materials and activities in their own time (asynchronous learning) (Otago Polytechnic Auckland International Campus, 2020). Moodle provides an opportunity to set up, customise and give access to all teaching materials and activities and create a “personalised learning environment” (Moodle, 2020). As Moodle currently has no functionality to ensure a synchronous online learning process (streaming lectures in a virtual space), OPAIC uses Microsoft Teams to deliver online classes and activities during COVID-19 pandemic lockdowns to replace cancelled face-to-face classes.

Currently, there is no set of organisationally accepted tools or techniques being used that can motivate students to work through the course materials. OPAIC Moodle data reveals extremely low learner engagement with the current course content (Personal communication, 2021). Moodle course analysis within the Applied Management Department has shown that most online courses are used to store resources such as PowerPoint presentations, links to articles, and videos. The resources of the LMS are not used in full and are limited to “passive learning”, a mode of presenting educational materials where students are supposed to “record and absorb knowledge” (McManus, 2001). This approach to LMS functionality is limited and can be outright damaging for student achievement in the conditions of COVID-19 lockdowns and periods of forced online-only classes (Zhukov & Staples, 2020).

The pilot study was aimed at creating an active learning space within a standard LMS Moodle course where students could collaborate, contribute, and co-create the course content to help achieve more effective learning (Dixson, 2015; Johnson, 2018). There has been a strong positive correlation between higher student achievement and engagement levels that include active learning methods (Freeman, et al., 2014; Donovan, 2005). Additionally, the OPAIC Learning and Teaching Strategic Framework focuses on “creating the conditions for individual learner success and build on OP reputation as an innovative lecturer of high-quality educational opportunities” (Otago Polytechnic, 2017).

DESIGN AND IMPLEMENTATION

The purpose of the pilot study was to redesign the content of one online course using the principles of active learning. A Bachelor of Applied Management undergraduate Leadership in Action course was used as the case. Students were not informed about the study to avoid any possible impact on their online behaviour patterns and consequently their study results. The study team used the analysis, design, development, implementation, and evaluation (ADDIE) approach during the implementation phase to constantly evaluate the effectiveness of implemented activities and techniques and make some adjustments or improvements for next week's delivery. The ADDIE framework has proved its efficiency in developing course materials as in the traditional face-to-face teaching environment (Drljača, et al., 2017) as well as in e-courses design (Güner & Taçgin, 2014; Ness & Greer, 2016).

Student web-logs were extracted from the LMS statistics reports for two occurrences of the same course (term 4 before re-design and term 5 after re-design in 2020, which will be further identified as 20-AIC-04 and 20-AIC-05 respectively). Web-logs provided detailed records of student behaviour as they interacted with the online course content in the digital learning environment. The course was taught by different

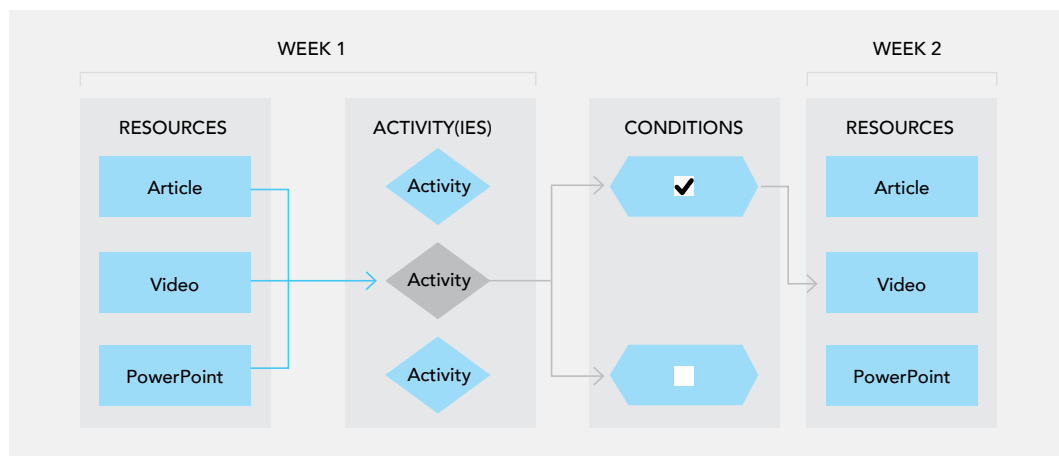
lecturers in the two study blocks, however, the course learning outcomes remained the same. Two assignments contributed towards the course final grade - 30% assignment one and 70% assignment two. However, assignment two had a group component in term 4 with each group member getting the same grade, whereas in term 5 the group project was assessed based on the individual contribution, i.e. all grades were individual (see Table 1).

Table 1. Assignment Structure and Weighting in 20-AIC-04 and 20-AIC-05

OCCURRENCE	ASSIGNMENT 1	ASSIGNMENT 2
20-AIC-04	30%	70% 30% Group 40% Individual
20-AIC-05	30%	70% Individual

The resources and materials were arranged into weekly blocks, developed, and uploaded by the lecturer as a paper expert. They served as sources of content and knowledge for active exercises which were set up by the LMS systems administrator in consultation with the lecturer. Some activities were compulsory and access to the next activity or weekly block had been set as conditional upon the activity completion (see Figure 1).

Figure 1. Conditional Learning Activities and Conditional Access



Throughout the eight-week course, different types of activities were set up. Some activities were designed for group collaboration (for example, Wiki), some were individual (Questionnaire, HTML5 package, summary, etc.), and some consisted of two parts, individual and group (two-part quiz). The number of compulsory activities depended on the amount of students' workload and assignment due dates. All the activities directly or indirectly contributed to completing assignments for the course.

DATA ANALYSIS AND DISCUSSION

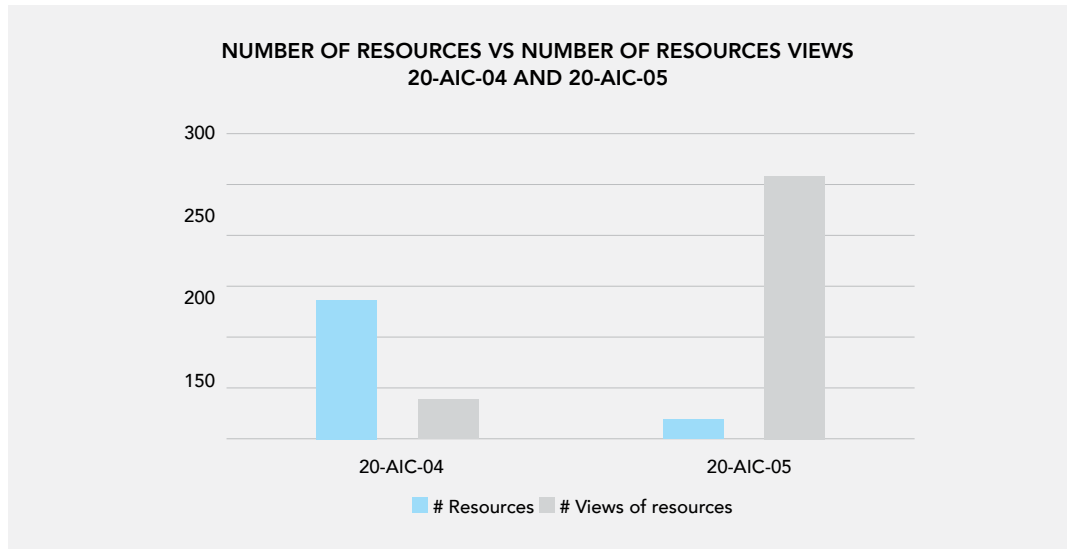
Students' online behaviour was tracked over the eight weeks that the course was running. Every interaction with the courses and activities was recorded in Moodle web-logs, which served as the primary source of data for the analysis. Table 2 demonstrates the comparative results of the web-log analysis for two consecutive iterations of the course.

Table 2. Comparative Analysis of Logs for 20-AIC-04 and 20-AIC-05

OCCURRENCES	# LEARNERS	# LOGS	# VIEWS	# RESOURCES	# VIEWS OF RESOURCES	# ACTIVITIES	#POSTS/ DISCUSSIONS
20-AIC-04	8	2358	1411	136	40	1	5
20-AIC-05	12	8477	7045	20	258	25	380

The number of interactions with the online course content more than doubled in 20-AIC-05. At the same time, the number of resources in 20-AIC-05 was almost seven times lower than the previous iteration. The resource types were quite similar in both iterations and included files, videos, articles, and PowerPoints. However, 20-AIC-04 had only one activity set in Moodle (a feedback tool – 5 students completed the activity), while there were twenty-five different activities in 20-AIC-05. Assignment submission links were excluded from the analysis as they were compulsory for the completion of the course. The increased number of resource views in 20-AIC-05 might signal that students may have been overwhelmed with the number of resources in term 4 and responded better to a smaller number of carefully selected and curated resources (Dabbagh & Fake, 2017). The more focused approach of the second iteration created the sense that each resource had a meaningful impact on the course and eliminated the need to sort through potentially unrelated content. Figure 2 provides a visual representation of the data on resource use.

Figure 2. Relationship Between the Number of Resources Available and Number of Resources Viewed by Students.



The content views were impacted by follow-up activities most of which were set up as compulsory. At the time of the pilot study, Moodle did not have the functionality to track the quality of students' interaction with a resource. The resource was marked "completed" if a student clicked on it, regardless of the time spent on the resource. The activities were a good way to check the understanding and engagement with the topic and created a bridge between the 'passive learning' and 'active learning' practices. The activity completion rate also dramatically increased if taken in conjunction with resources.

The activity completion rate in the Leadership in Action course for the second iteration was increased

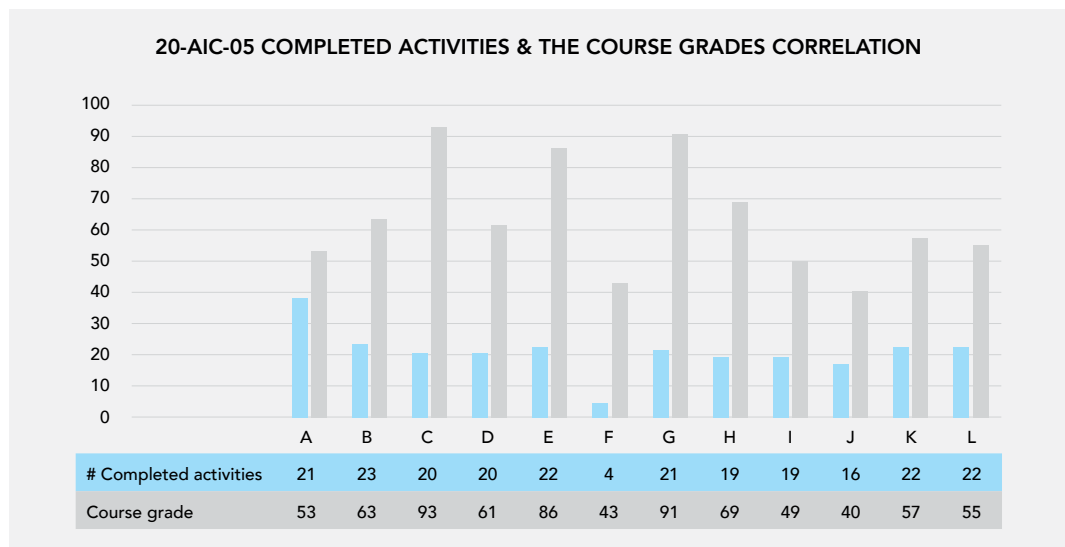
through a set of restrictions for the week’s materials. Activities that were not set as compulsory and, therefore, did not have any materials/topics connected with their completion were ignored regardless of the content. For example, e-journal submission links for weeks 6, 7, and 8 were not compulsory. Only one student submitted the e-journal entry in week 6 and nobody submitted at all in weeks 7 and 8. Another example is the H5P activity. Despite the engaging and game-like nature of the activity (Lambda Solutions, 2020), only four out of twelve students completed it when it was not linked to conditional access to further materials.

Conditional access based on activity completion added some gamification principles to the Moodle course, which is in line with the modern educational trends for increasing student engagement (Hodge, 2019; Thurston, 2018). The sense of progression is like what games provide (van Roy & Zaman, 2018). The online course also had a set of rules and principles, guides and techniques to lead the students through a gamified learning journey (Geitz et al., 2019). This approach helped to improve the students’ participation.

Course feedback collected at the end of week eight indicated that the students were generally supportive of the resource and activity design. But their interest waned over the course of their studies and, particularly, as they were approaching the due date for summative assignments. The design added to the students’ anxiety as they felt that any task that they had not opened could have been critical for their summative assignment. Some students had only a few modules opened due to incomplete activities as “[there was] not enough time”. Some students reported that “initially, the new methodology appeared to be exciting and there was a sense of motivation to complete the tasks before the deadline” but “towards the end, the pressure of the deadline of the weekly tasks sometimes rose the stress levels”. Another student mentioned that “it was interesting and fun at first, however, piles of workload, stress, and pressure resulted in unfinished tasks and not being able to access the next week”.

Making access conditional on activity completion proved to be a challenge for the lecturer of the course (Jaremka et al., 2020). The problem started appearing only when a handful of students were significantly ahead of the others. Students did not have access to certain parts of the course disrupted the lesson plans. Imagine a face- to-face class where only half the students can see the materials necessary to complete the tasks and having to constantly try and catch up. This put a significant strain on the planning of the class activities and ended up adding to the anxiety levels of both students and the lecturer.

Figure 3. Relationship Between Completed Activities and the Final Course Outcomes



There were 25 different activities set during the pilot study to support weekly topics in the redesigned Moodle course. Not every activity was compulsory. One of the questions that the pilot study wanted to try and answer was whether there existed a correlation between the number of completed activities and the grades in 20-AIC-05. The activity completion rate fluctuated, a weak positive correlation could be seen between the number of completed activities and the course outcomes (see Figure 3). Students F and J, who failed the course, had the lowest number of completed activities. Student, I had the same number of completed activities as student H, who successfully passed the course. Students C and G with the highest grades have around 80% completed activities.

CONCLUSION

Student engagement increased after the LMS, Moodle course redesign. The data on engagement with online resources highlights the benefits of applying the principles of experiential learning to Moodle content. Higher engagement is likely the result of a combination of factors including the smaller number of resources and activities, conditional access to tasks, the structure of classes, and redesigned assignments that shifted the onus to individual contributions. The results also suggest that a balanced combination of activities and resources in the LMS is an effective practice to introduce different types of learning (Dabbagh & Fake, 2017; Reigeluth et al., 2015). There is no direct correlation between the type of Moodle activity and student engagement and even making activities compulsory does not guarantee their completion. Students could still ignore compulsory tasks even when it came at a detriment to their grade or increased their levels of anxiety, yet they were much more likely to eventually be completed if only to access the subsequent topics. The results show that introducing activities to complement LMS resources was a productive way to improve course efficiency in a blended learning environment. Analysis of the data obtained in this pilot study indicates that the activity completion feature combined with conditional access proved to be effective and engaging for the students as it helped to gamify the course. The number of completed activities combined with resource viewings was almost 70% after the course redesign compared with 3% in the previous study block for the Leadership in Action course. However, the proportion of compulsory activities should be balanced, and students' workload needs to be closely monitored to avoid raising anxiety levels because of hidden modules.

It was important to keep a few points in mind. First, it is recommended to incorporate activities in addition to resources into online course content as follow-up tasks. The pilot study proved that the activities supported knowledge assimilation via additional exposure to the topics discussed during face-to-face classes. The findings demonstrated a positive correlation between the number of completed activities in the online course and students' academic achievements. The second recommendation is to limit the number of resources in a Moodle course focusing on the quality of materials rather than quantity. The resources uploaded to Moodle courses should have definitive value for students as a source of information curated by the lecturer which will help them to complete their summative assignments and successfully finish the course. Finally, conditional access proved to be an effective and engaging strategy for the students at the start of the course. However, as the course progressed, the lecturer needed to consider additional strategies for retaining learner engagement as it is important to make sure that students understand the value of progressing through the materials. It is recommended to start the course using conditional access but carefully manage the learners' workload to make sure it is balanced.

The Leadership in Action Moodle course content redesign was an effective and accessible way to complement face-to-face classes in a blended learning environment. Evidence from the project could be used to facilitate students' engagement and learning in a digital space. Further research is recommended to determine the optimal balance between resources and activities in a Moodle course.

Olga Ustinova arrived in Aotearoa New Zealand as an international student in Otago Polytechnic Auckland International Campus pursuing her Postgraduate Diploma. Since graduating, she has been working for

over two years as a Systems Administrator with a strong focus on Moodle learning platform. Her previous experience as a student helps her to see Moodle from both sides and assist lecturers to use Moodle more effectively.

Email: Olga.Ustinova@op.ac.nz **Phone:** 021 051 5115

Barnaby Pace is a Principal Lecturer at Otago Polytechnic Auckland International Campus where he teaches Research Methodologies and Analytics courses for Applied Management students. He holds qualifications in Psychology, Cognitive Science, Education and Quality Systems.

Yury Zhukov's journey in Aotearoa New Zealand started when he decided to pursue his research interests in deliberative democracy and e-government at the University of Auckland. He has been working in tertiary education alongside other jobs for over fifteen years. Yury has a research Master's degree and is working on his Ph.D. at the moment.

Email: yuryz@op.ac.nz **Phone:** 021 849184

REFERENCE

- 01 Alves, G. R., Viegas, M. C., Marques, M. A., Costa-Lobo, M. C., Silva, A. A., Formanski, F., & Da Silva, J. B. (2013). Impact of different Moodle Course Designs on Students' Performance. *International Journal of Engineering Pedagogy (IJEP)*, 3(S2), 18. <https://doi.org/10.3991/ijep.v3iS2.2397>
- 02 Anderson, J., & Rainie, L. (2015, October 23). Digital Life in 2025. Pew Research Center: Internet, Science & Tech. <http://www.pewinternet.org/2014/03/11/digital-life-in-2025/>
- 03 Bouchrika, I. (2020, August 19). 10 Online Education Trends: 2020/2021 Predictions, Reports & Data. Retrieved from www.guide2research.com: <https://www.guide2research.com/research/online-education-trends>
- 04 Dabbagh, N., & Fake, H. (2017). College Students' Perceptions of Personal Learning Environments Through the Lens of Digital Tools, Processes and Spaces. *Journal of New Approaches in Educational Research*, 6(1), 28–36. <https://doi.org/10.7821/naer.2017.1.215>
- 05 Dixon, M. (2015). Measuring Student Engagement in the Online Course: The Online Student Engagement Scale (OSE). *Online Learning* 19(4).
- 06 Donovan, J. (2005). Active Learning in Online Classes. World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, (pp. 1280-1284). Vancouver.
- 07 Drljača, D., Latinović, B., Stanković, Ž., & Cvetković, D. (2017). ADDIE model for development of e-courses. Conference: Sinteza 2017. Belgrade.
- 08 Freeman, S., Wenderoth, M. P., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafo, N., & Jordt, H. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences of the United States of America*, (pp. 8410-8415).
- 09 Geitz, G., de Geus, J., & Tinoca, L. (2019). Design-based education, sustainable teaching, and learning. *Cogent Education*, 6(1). <https://doi.org/10.1080/2331186X.2019.1647919>
- 10 Güner, N. E., & Taçgın, Z. (2014). ADDIE Model in Adult Education: Instructional Design Sample of E- Learning. Conference: 5th International Future-Learning Conference on Innovations in Learning for the Future 2014. Istanbul.
- 11 Guo, R., Shen, Y., & Li, L. (2018). Using Social Media to Improve Student-Instructor Communication in an Online Learning Environment: *International Journal of Information and Communication Technology Education*, 14(1), 33–43. <https://doi.org/10.4018/IJICTE.2018010103>
- 12 Hodge, P. (2019, October 31). 3 Ways Effective Microlearning Maximizes Learning Retention. Retrieved from www.learningsolutionsmag.com: <https://learningsolutionsmag.com/articles/3-ways-effective-microlearning-maximizes-learning-retention>
- 13 Jaremka, L. M., Ackerman, J. M., Gawronski, B., Rule, N. O., Sweeny, K., Tropp, L. R., Metz, M. A., Molina, L., Ryan, W. S., & Vick, S. B. (2020). Common Academic Experiences No One Talks About: Repeated Rejection, Impostor

- Syndrome, and Burnout. *Perspectives on Psychological Science*, 15(3), 519–543. <https://doi.org/10.1177/1745691619898848>
- 14 Johnson, B. R. (2018). Active Learning for Students and Faculty. *Journal of undergraduate neuroscience education*, 32-33.
 - 15 Kandri, S.E. (2020, May 12). How COVID-19 is driving a long-overdue revolution in education. Retrieved from www.weforum.org: <https://www.weforum.org/agenda/2020/05/how-covid-19-is-sparking-a-revolution-in-higher-education/>
 - 16 Kim, H. J., Hong, A. J., & Song, H.-D. (2019). The roles of academic engagement and digital readiness in students' achievements in university e-learning environments. *International Journal of Educational Technology in Higher Education*, 16(1), 21. <https://doi.org/10.1186/s41239-019-0152-3>
 - 17 Lambda Solutions. (2020, May 28). What is H5P? (And Why Your eLearning Needs It!). Retrieved from www.lambdasolutions.net: <https://www.lambdasolutions.net/blog/what-is-h5p-and-why-your-elearning-needs-it>
 - 18 Li, C., & Lalani, F. (2020, April 29). The COVID-19 pandemic has changed education forever. This is how. Retrieved from www.weforum.org: <https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/>
 - 19 McManus, D. A. (2001). The Two Paradigms of Education and the Peer Review of Teaching. *Journal of Geoscience Education*, 423-434.
 - 20 Moodle. (2020, August 31). About Moodle. Retrieved from docs.moodle.org: https://docs.moodle.org/39/en/About_Moodle
 - 21 Ness, A. N., & Greer, K. (2016). Designing for Engagement: Using the ADDIE Model to Integrate High- Impact Practices into an Online Information Literacy Course. *Communication in Information Literacy*, 264-282.
 - 22 Otago Polytechnic. (2017). The Learning and Teaching Strategic Framework.
 - 23 Otago Polytechnic Auckland International Campus. (2020). When can you study? Retrieved from Auckland International Campus - Otago Polytechnic: <https://auckland.op.ac.nz/>
 - 24 Reigeluth, C. M., Aslan, S., Chen, Z., Dutta, P., Huh, Y., Lee, D., Lin, C.Y., Lu, Y.H., Min, M., Tan, V., Watson, S. L., & Watson, W. R. (2015). Personalized Integrated Educational System: Technology Functions for the Learner-Centered Paradigm of Education. *Journal of Educational Computing Research*, 53(3), 459–496. <https://doi.org/10.1177/0735633115603998>
 - 25 Thurston, T. N. (2018). Design Case: Implementing Gamification with ARCS to Engage Digital Natives Digital Natives. *Journal on Empowering Teaching Excellence*, 23-52.
 - 26 van Roy, R., & Zaman, B. (2018). Need-supporting gamification in education: An assessment of motivational effects over time. *Computers & Education*, 127, 283–297. <https://doi.org/10.1016/j.compedu.2018.08.018>
 - 27 Zhukov, Y., & Dai, B. (2020). *Dynamic Informal Capabilities in Project-Based Assessments*. ePIC 2020, the 18th International Conference on Open Education and Open Recognition technologies and practices, Online 26-28 October.
 - 28 Zhukov, Y., & Staples, J. (2020). I, Avatar. In *Collective Voices of COVID-19*. Otago Polytechnic Ltd.