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The Holodeck model, learning environments, and resilience in higher education: A multidisciplinary approach

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This paper proposes a flexible framework for developing asynchronous online learning environments for multidisciplinary contexts at an Australian university. The project addresses the need to build organisational resilience following the fragility demonstrated by educational institutions during the emergency transition to online learning in 2020. The paper examines the challenges experienced by staff and students, the future implications and the potential of the Holodeck model of a learning environment in circumventing these barriers. The analysis of the strategies implemented through various educational technologies in criminology, teacher education, international relations and research methodology, demonstrated its applicability in diverse academic fields. The paper promotes the capacity of the Holodeck-based framework to provide systematic support structures for university online and on-campus programs, and, consequently, to develop institutional resilience in multidisciplinary university contexts. The paper also outlines the next phase of the project, focusing on a student perspective of the use of the Holodeck model.

Keywords: learning environment, tertiary education, multidisciplinary, online asynchronous framework, the Holodeck Model

Introduction

The emergency transition into online mode of delivery during the COVID-19 pandemic demonstrated the fragility of the global educational systems caused, largely, by the lack of institutional preparation for a crisis. This paper presents a project in progress, which explores a framework for learning environments as a strategy for enhancing educational resilience. A learning environment is defined here as a flexible conceptual space developed with educational technology to support and enhance university programs delivered either online, multimodally, or on-campus ('brick-and-mortar') (De Toni & De Marchi, 2023; Gurtner, 2014; Keržič et al., 2019). First, the paper outlines the barriers experienced during the rapid transition to online learning and the implications they carry for the future. The next sections introduce the concept of the Holodeck as a framework for designing learning environments, a rationale for its application in university multidisciplinary contexts and research methodology employed for the project. The findings examine the strategies implemented in diverse disciplines and propose the Bond Holodeck framework.

Literature review: The need for a learning environment framework and introducing the Holodeck

The transition to online education globally in 2020 highlighted the need to define and adopt systematic pedagogy-based models of online environments to maximise student learning (De Toni & De Marchi, 2023; Keržic et al., 2019; Thornburg, 2014). The speed of the transfer meant that institutions were not ready to draw on the strengths of online learning and were not prepared for its constraints (Killham et al., 2022; Martin et al., 2022). The new concept of emergency remote learning, introduced to differentiate between the rapid institutional shift to online programs delivery and planned and targeted 'traditional' online education, emphasised the pivotal role of systematic pre-planning in enhancing the effectiveness of online environments (Hodges et al., 2020; Martin et al., 2022). Establishing the challenges institutions encountered at that time reinforced insights into how unplanned online education can negatively impact student learning (Cranfield et al., 2021; Iglesias-Pradas et al., 2021; Takács et al., 2023).

The identified challenges concerned many aspects of learning and teaching, with some, such as the inequity in access to digital technology (the digital divide), largely outside the influence of educational institutions. Many

barriers, however, could be attributed to the lack of institutional preparation. These included teachers' limited knowledge of appropriate pedagogical models and educational technologies, students' limited ability to navigate in a digital education environment and to work independently, and an institutional lack of structures for supporting staff and students in online learning (Bolliger & Martin, 2021; Cranfield et al., 2021; Iglesias-Pradas et al., 2021; Killham et al., 2021; De León, 2022; Martin et al., 2022). In particular, poor learner engagement was found to be one of the primary factors impacting learning and a key consideration for the future. This complex concept affects behavioural, cognitive, emotional, and social dimensions of student learning (Fredericks et al., 2016). Martin et al (2020) pointed to the following multiple categories which require consideration when seeking to improve online learner engagement: interaction, presence, communication, collaboration, community and participation. The studies of student experience during the 'emergency eLearning era' further highlighted the need for a targeted preparation of online environments, with a strengthened focus on learner engagement (Aladsani, 2022; Chiu, 2021; Killham et al., 2022; Martin et al., 2022; Zweig et al, 2022).

The analysis of the difficulties students and educators experienced during the emergency remote learning helped formulate features of effective learning environments which aimed to redress challenges with learner engagement, and to circumvent or minimise these in the future (De León, 2022; Martin et al., 2022; Zweig et al, 2022). One of the recommendations was the inclusion of both asynchronous and synchronous modes of content delivery as the blended format provided stronger support for both, online and on campus students.

Asynchronous resources were reported to increase flexibility and the diversity of learning structures, allowing learners to engage with the subject matter in multiple ways (Martin et al., 2022; Wagner, 2022). Additionally, the value of asynchronous activities was promoted as reducing an overuse of synchronous tools and preventing online burnout and fatigue (Martin et al., 2022; Murphy et al., 2020). Another implication pointed to the need to incorporate tasks encouraging and targeting interaction due to their value in supporting learner engagement (Iglesias-Pradas et al., 2021; Lowenthal et al., 2020; Yang et al., 2022). Further, a consistent approach to designing learning environments was identified as a strategy for fostering effective learning environments, as the lack of uniformity was reported to have a negative impact on student learning (Iglesias-Pradas et al., 2021; Yang et al., 2022). The significance of social and affective learner engagement advanced the importance of establishing a safer learning environment and informal spaces for peer learner community (Martin et al., 2022; Roman, 2022). Finally, as teachers' support is considered the most effective learner engagement strategy, research advocated for on-going professional development to extend teacher knowledge of appropriate pedagogies and use of technologies, to help them develop a rich repertoire of strategies for engaging learners (Iglesias-Pradas et al., 2021; Yang et al., 2022).

Consequently, the analysis of the factors influencing 'traditional' online learning, enriched by the data emerging from COVID-19-driven shift to e-Learning, identified several key areas of concern, and formulated recommendations for building future institutional resilience. Many barriers such as inadequate knowledge of appropriate online pedagogies or educational technology skills as well as an institutional lack of support structures have been attributed to the lack of preparation for online education. The implications formulated on the basis of the identified challenges propose strategies for improving student learning and, as a result, enhancing institutional resilience. These recommendations include the development of learning environments with a blended format of content delivery, implementing the targeted professional development for educators to enable them to design uniform systematic frameworks promoting learner engagement and to provide support for strong communities of practice.

The Holodeck as a learning environment

The concept of a Holodeck as a learning environment was proposed by Thornburg (2014) as a model for designing brick-and-mortar and online learning spaces which enabled learners to engage in different modes of learning. The term 'Holodeck', originated by the Star Trek science-fiction series, is a fictional space where the Star Trek USS Enterprise crew could freely interact with environments of their choice. Thornburg's (2014) Holodeck is recognised for its systematic promotion and the significance of different modes of learning, with numerous schools globally designing learning spaces in school buildings following the model. The Holodeck is a concept of a complete learning environment where learners can engage in four modes of learning. The first element, (1) Campfires, is the home of the traditional storytelling or a lecture, where the arbiters of knowledge (the traditional elders or contemporary educators) disseminate it to their listeners. The second element of the Holodeck, (2) Watering Holes, promotes activities supporting social interaction. The significance of social interaction for learning is reflected in many current pedagogical approaches, which view it as essential for thought organisation and the construction of new knowledge (Baber, 2021; Scarino & Liddicoat, 2009; Vygotsky, 1978). The third element of the Holodeck, (3) Caves, provides learners with a space for reflection and something to reflect on. Reflection, also considered as a pivotal aspect of learning, forms part of many current

pedagogies such as intercultural, work-based, experiential and online learning models (Chang, 2019; Helyer, 2015; Kolb, 1984; Scarino & Liddicoat, 2009). The fourth element, (4) Life, involves tasks and strategies enabling students to apply their knowledge to real-life situations. Thornburg's (2014) Life underscores the role of knowledge activation in real life contexts and epitomises the pedagogy of experiential, translational and simulation-based approaches to learning and teaching (Dinnen & Harmon II, 2019; Harmer, 2015; Helyer, 2015; Kolb, 1984). Consequently, The Holodeck represents a framework where learners can engage in four essential types of activities, following key principles of current learning theories of learning and teaching.

As a result of extensive research into pedagogy-based learning environments, Thornburg's (2014) Holodeck model was initially adopted in TESOL programs at Bond University aiming to develop a systematic framework for supporting online students (Malczewska-Webb et al., 2016; Webb & Vallero, 2018). The functionality and flexibility of the framework motivated its adoption in all the TESOL and Spanish language subjects. According to on-campus and online students' feedback, the adoption of the framework significantly improved the quality of their learning experience (Webb & Vallero, 2018). In 2020, both, online and on-campus TESOL student cohorts were well equipped with skills necessary for the transition into online delivery, strongly supported through access to a well-developed systematic asynchronous learning environment. At this difficult time, lecturers in other programs undertook extensive professional development in preparation for online delivery, with many drawing on the TESOL program experience in online teaching approaches, strategies and learning design. This intensive teacher collaboration also demonstrated the transferability of models and practices gained by the TESOL lecturers. The positive student evaluation of the Holodeck model, the resilience demonstrated by the TESOL students and the transferability of skills and models onto other discipline areas have motivated the current project, aiming to explore the value of the Holodeck in multidisciplinary contexts. The dramatic difference between stakeholder experience in targeted, pre-planned 'traditional' online education and emergency online teaching highlighted the role of preparation in supporting student learning and building institutional resilience.

Research methodology

Based on the pedagogical and design principles of Thornburg's (2014) Holodeck model, the Bond Holodeck has been constructed for designing asynchronous online learning environments to support student learning at a university. The first aim of the project is to design a framework of a flexible learning environment for multidisciplinary contexts. The second aim, achieved through the application of the framework, is to improve the pedagogy and design of online support structures which, consequently, will contribute to enhancing educational resilience of the university. The first phase of the project, described in this paper, examined the usability of the Holodeck, with educators undertaking a formal inventory of educational strategies aligning with the Holodeck elements. The project involves three lecturers in four disciplines: International Relations, Criminology, TESOL and Research Methods, and one educator from the university's Office of Learning and Teaching. The majority of students, both in postgraduate and undergraduate programs, study on campus, with some postgraduates enrolled in online offerings. The online environments, developed using the Blackboard Learning Management System platform, support both, online and on-campus student learning. The second phase of the project will evaluate the model and its strategies from a student perspective. The quantitative methods will involve analysing (1) student engagement patterns with strategies of the Blackboard Learning Management System and (2) electronic subject teaching evaluations (eTEVALs). Qualitative methods will include analysing open questions in eTEVALs and semi-structured interviews with students to obtain a greater understanding of student engagement in the Bond Holodeck strategies. The initial focus of the project was the implementation of Rise Articulate 360 platform as the three lecturers found this platform particularly useful in developing flexible Holodeck-type activities. With the progression of the project, more educational technologies were included in the inventory to provide a broader range of ideas for the multidisciplinary Bond Holodeck activities. Educators also used Kahoot, Poll Everywhere, Quizlet, Camtasia, PowerPoint Record, Doodly and Office 365 Sway and OneNote to develop subject learning environments.

Findings: The Bond Holodeck, its core and flexibility

The analysis of the inventory of the activities employed by the educators in the four discipline areas identified an overwhelming consistency in their application. As illustrated in the table below in blue, most of the activities across the disciplines align with the four Bond Holodeck elements. All discipline areas included either explicit activities for student engagement (e.g. videos and tasks for teaching observations) or resources preparing student engagement in synchronous learning (e.g. preparation for Model UN sessions or Escape Rooms). The differences between TESOL and other areas, marked in orange, demonstrate segments added as a result of the earlier research-based design improvements in this specific discipline. Another difference, in green, points to the

collaborative cloud-based activities used in the TESOL and International Relations only. Overall, the table shows the consistent use of activities embedded in the Holodeck by all educators. The homogeneity of the core categories supports the view of the Holodeck as a model applicable across diverse disciplines. The differences in categories designed for learner engagement highlight the diversification between the disciplines and point to the potential areas for improvement, where implementing appropriate strategies can enrich the support for student learning. As far as the differences between specific activities are concerned, they ascertain the flexibility of the framework which allows for the application of a wide variety of activities, both multidisciplinary and specific to a discipline, in different elements of the Bond Holodeck model.

Conclusions

To conclude, the analysis of pedagogical practices undertaken for the purposes of this project has demonstrated the applicability of Thornburg's (2014) Holodeck model for developing multidisciplinary learning environments. The proposed Bond Holodeck presents a strong argument in support of a pedagogy-based flexible framework for developing learning environments. The framework supports learner engagement through systematic planning for interaction, communication, collaboration, community and participation. The framework provides a rich repertoire of options for educators and multiple structures with flexible activities for learners to engage in. It also assists in the development of student learning community and an interdisciplinary teacher community of practice. As a multidisciplinary model, the universal framework ensures cohesion and uniformity across disciplines. Overall, it is proposed that the Bond Holodeck will improve learning and teaching at a university and, consequently, strengthen institutional resilience. The next phase of the project will explore a student view of the Bond Holodeck as an effective learning environment.

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