



An Evaluation of Using Virtual Teams to Map Innovative Learning Environments into the Tertiary Learning Space

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The term Virtual Teams indicates a group of individuals who work together, often from various geographical locations, using a variety of technological tools to collaborate to achieve a common goal (O'Duinn, 2018). While there is developing interest and value of Virtual Teams to build international relationships (Hu, 2015), there is relatively little research into the benefits of adopting the Virtual Teams approach to address student learning in online university environments (McCarthy, 2012). The current article addresses that gap in the scholarly literature. To successfully embed a Virtual Team model into an online platform, however, a framework to support its delivery was deemed necessary. A model, the *Virtual Teams model within the ACAD framework* (Page et al., 2020), using an Innovative Learning Environment (ILE) design, was applied to meet this end.

The new model was applied within a redesigned course that sits within a School of Education Master's degree in Australia. It was considered that understanding and implementing Virtual Teams in higher education is valuable for higher education students, particularly in response to the COVID-19 pandemic, which resulted in university closures and online delivery of content. While the implementation of the Virtual Teams approach was not directly a shift to online learning because of the impact of COVID-19, it ultimately proved valuable in supporting student engagement and outcomes and the introduction of sound educational pedagogies.

To continue to meet learners' needs, the university could not merely shift face-to-face content to an online interface. The evolution of post-secondary education from traditional paper-based teaching methodologies to the use of flexible digital technologies has been an ongoing issue for many institutions (Coussement, 2020). However, to support such a shift in methodology and practice, considered thought was needed to address the sudden shift to virtual teaching and learning due to the impact of COVID-19, which at the same time provided a catalyst for innovation that was long overdue.

Primarily, the research suggests that to become effective learners in the online learning environments, students need to be problem-solvers, critical thinkers and work in groups using digital resources (Benade, 2019; Stephenson, 2018; Yoon & Gruba, 2017). Additionally, Virtual Teams adopt a collaborative knowledge construction where students participate in learning with peers (Hu, 2015). This means Virtual Teams allow students to prepare for and practice the necessary skills needed to negotiate their work environment (Salmon, 2019). Furthermore, the benefits from collaborating in Virtual Teams is well documented, especially for practitioner professional development that supports ongoing networking opportunities for those working across geographical locations (Wieland & Wolf, 2016).

There are similarities between Virtual Teams' characteristics in work organizations and tertiary online learning delivery to groups of higher education students. There is a need to be flexible with time and use digital tools to support online engagement, particularly at the Master's

level when many students are in employment. Therefore, it is helpful to refer to the literature on Virtual Teams to inform practices within the university context for students enrolled online.

Literature Review

Virtual Teams and their Relevance in Education

Virtual Teams are groups of people who engage in online collaboration to accomplish learning or a task. The task orientation distinguishes virtual teams from online group work that may or may not consist of working together to develop an end product. Hertel, Geister, and Konradt (2005) describe Virtual Teams as "(a) two or more persons who (b) collaborate interactively to achieve common goals, while (c) at least one of the Team members works at a different location, organization, or at a different time, so that (d) communication and coordination is predominantly based on electronic communication media" (p. 71). Virtual Teams can provide opportunities for tertiary students to engage with each other when there are few chances to interact face to face (Dulebohn & Hoch, 2017).

The use of Virtual Teams in tertiary settings can be an ideal pedagogical approach for online teaching and learning, as graduates can develop skills for working across global contexts and allow flexibility of time with synchronous and asynchronous modes of communication, connections across distance, and enables the capacity for collaboration (Ubell, 2010). As Moore (1993) explains through the Theory of Transactional Distance, teaching and learning are supported by the continuous dialogue where knowledge creation occurs post-course design by exchanging words and other symbols of knowledge. Distance education and its extension of eLearning and online learning can significantly reduce this phenomenon. The approach supports the synergistic characteristics of knowledge building through dialogue as each member and each exchange builds upon the other team members' contributions and comments. In this way, Virtual Teams work to build collaborative dialogue toward a common goal or understanding.

Within the online learning environment, the Virtual Team structure can support students' needs and interests. New and evolving technologies can provide effective communication and relationships, specifically with the content relevant to the students' careers (Soulé & Warrick, 2015). Successful Virtual Teams are considered teams where participants become effective communicators, develop processes for sharing knowledge, develop trust between the team members, and support the development of interpersonal skills in the virtual workspace (Chatfield, Shlemoon, Redublado, & Darbyshire, 2014). Additionally, Virtual Teams can share skills, knowledge, and experiences online that would otherwise not be possible if they were to engage in alternative learning methods (Chatfield et al., 2014). Instead of students being passive recipients

of their online learning, students can maximize the potentials provided by participating in Virtual Teams.

To successfully embed a Virtual Team model into an online teaching platform, it was considered necessary to develop a framework to inform the design changes required to successfully embed a Virtual Team model into an online teaching platform. We used a framework for innovative learning environments (ILEs) to meet this end. Innovative Learning Environments use innovative learning spaces in higher education designed to be flexible and collaborative to promote student engagement and learning (Jamieson, Miglis, Holm, & Peacock, 2008). This paper begins with a discussion on how the principles underpinning the design of ILEs were mapped into an online learning environment, and the use of Virtual Teams attained the reorganization of existing pedagogy to meet the changing landscape of student education for new millenniums (Harasim, 2017; Sankey & Hunt, 2017). Secondly, we outline specific traditional approaches of online teaching in universities that are not well-aligned with the provision of 21st-century education that develops problem-solving and critical thinking skills for students. Finally, we review the successes and challenges of using the *Virtual Teams model within the ACAD framework*, outlining the necessary building blocks to maximize learning outcomes for students in the online environment.

Traditional Online Teaching and Learning

Universities have, by some, been regarded as places that fail to embrace change (Carabine, 2016) and rely heavily on traditional academic work practices (Rai & Chunrao, 2016). While universities are changing in their delivery of courses and units, criticism has been noted around the pedagogy that lecturers engage with, with arguments suggesting that there need to be more engaging and innovative teaching practices (Kopcha, Rieber, & Walker, 2016). Ironically, a possible reason to maintain the status quo is that students themselves possess a sentimental conception of lecturers, reporting a trend towards favoring traditional 'chalk and talk' lectures (Clayton et al., 2018; So, 2012).

As online courses have grown exponentially (Radford, 2011), unfortunately, there was a limited understanding of how new pedagogies could be developed within this new learning platform (Siemens, Gašević, & Dawson, 2015; Weaver, 2006). Although they were designed to be innovative, the notion of innovation has been "a placeholder description for anything other than a standard or well-entrenched practice" (Kopcha et al., 2016, p. 496). As a result, lecturers continue to deliver lectures in a hall, followed by a one-hour tutorial that discusses the lecture material. In many cases, the lecture method of teaching delivery has merely been transposed into the online space (DeBoer, Ho, Stump, & Breslow, 2014).

However, some online courses have developed innovative pedagogy to address this new way of learning (Yoon & Gruba, 2017; De Jong, 2020). Grouping students has become more common (Healey, Flint, & Harrington, 2016), as have quizzes, the adaptive release of course information, and the use of embedded videos (C. Leonard, personal communication, November 2, 2019). In an analysis of online teaching over the last ten years, Park and Shea (2020) found that popular methods included asynchronous discussions in the online community, the use of social media, video, audio, and collaboration tasks in learning.

Although changes in online teaching are evident, the delivery of online teaching has continued to bring criticism. Stephenson (2018) argues that online learning in itself is an incongruity, as teaching material delivered through didactic traditional teaching methods is merely replacing the teacher with a computer. Instead, experiential learning (Muvingi, McKay, & Katz, 2018), learner-managed approaches ((Jackson, 2018), and co-constructivist learning (Reusser, Pauli, & Wright, 2015) are considered to be approaches that lend themselves to more meaningful online learning. These approaches are aligned with the needs of the 21st-century learner (Stephenson, 2018).

A reconfiguration of the teaching and learning online learning within universities is needed. Our re-conceptualization changes places of learning from weekly teacher content to spaces of learning that allow for flexibility in how they are used and attempts to change the nature of the relationships within that space (Istance & Dumont, 2010). The re-conceptualization also allows collaboration and team-based learning (Mei & May, 2018) for students. The changing nature of the relationships between students and students and lecturer affords opportunities to be created that are less likely in more traditional online teaching. These pedagogical features include the implementation of student-centered learning and project-based inquiry (Benade, 2019).

Using Carvalho and Yeoman's (2018) framework to apply the principles of ILEs to the *Virtual Teams model within the ACAD framework*, we were able to map the components of the set, epistemic, social design, and co-creation and co-configuration activities into an online course. In doing so, we provided a conceptual structure for the provision of a digital tertiary ILE. We chose to use this framework as it brought together the space and practice of ILEs and allowed for a seamless mapping into the online context, as it aligns very well with online platforms commonly used in higher education.

Virtual Teams within a Digital Tertiary NGLE framework

To facilitate the implementation of Virtual Teams within the digital tertiary ILE design, we aligned identified elements of Virtual Teams in the literature to provide a model for online practice associated with the principles of the ACAD framework. For the model and framework to support

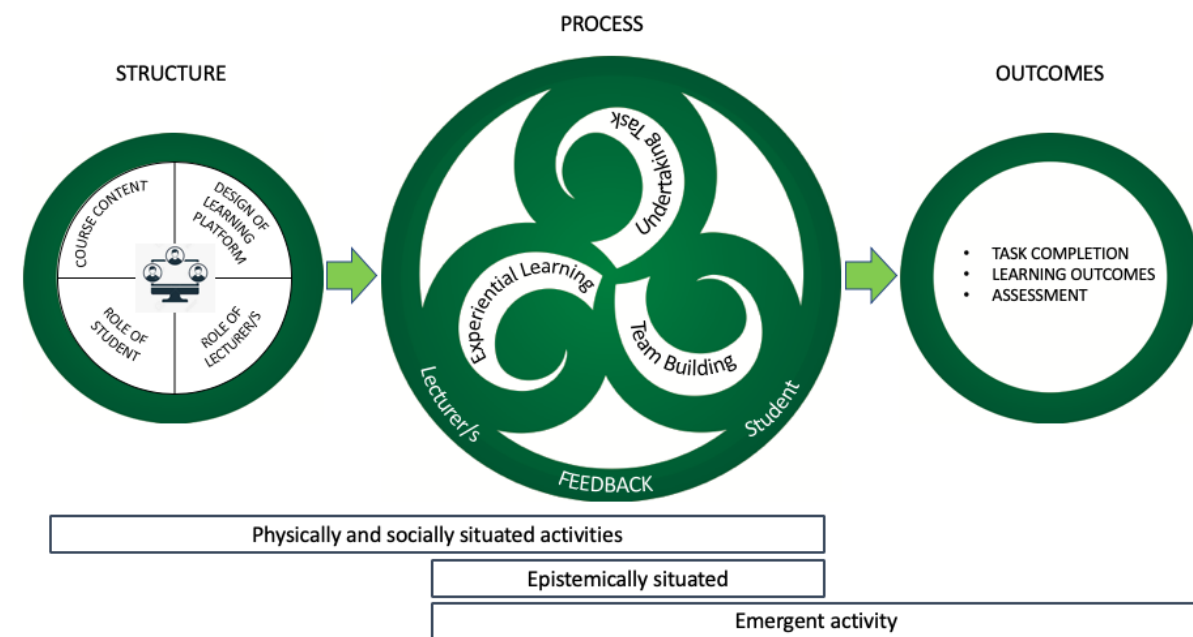
each other, one needs to adhere to the principles and values of ILEs. The principles and values regarded in the literature to be significant, such as student-centered approaches to learning, experiential learning, real-world applications of learning, sensitivity to individual differences, and the involvement of formative assessment strategies, were included (Istance & Kools, 2013).

Virtual Teams Model

Mapping the ACAD framework onto the Virtual Teams model is shown in Figure 1. The development of Virtual Teams within online learning was arranged to reflect the nature of teaching and learning sequences.

Figure 1

Virtual Teams Model within the ACAD Framework



The *Virtual Teams Model within the ACAD Framework* maps ILE principles into the online learning environment and embeds Virtual Teams to align the ILE framework's group work aspects. A university Master's course was subsequently written based on the model. See Page et al. (2020) for a comprehensive outline of the course design. Briefly, the design involved addressing aspects of Structure, Process, and Outcomes.

Structure

Structural considerations include managing and arranging course content that accounts for relevance and multiple means of representation (video, text, readings). Additionally, within the structure, the student's role needs to be carefully articulated and expectations set. The role of lecturers also needs to be defined, where the role changes from facilitation rather than the lecturer as a provider of information. The course structure also requires the plan to be cognisant of the design of the learning platform, which requires mapping the concept of a physically situated space into an online platform and involves considerations such as the visual design of the online site itself as well as the use of technological platforms within it.

Process

Process considerations involve inserting experiential learning opportunities in the course that enable learning through experiences and learning through reflection. Team building is an essential aspect of the course process, and caution needs to be taken to develop team collaboration skills and establish processes to counter any difficulties students might encounter in teams.

Further, the process of a course design also needs to take into consideration how students undertake tasks. Tasks are co-created and co-configured activities that require teams to provide a plan of the project and culminate in the project's completion. Finally, lecturer/student feedback is suggested as a necessary component within course design as it provides opportunities for students to engage with consistent formative feedback within the process cycle.

Outcomes

Outcome considerations include designing task completion group co-constructivist collaboration activities. It is essential and can be overlooked in design that task completion aligns with the learning outcomes. The Outcome process's final consideration is to ensure that students understand the educational value and purpose of assessments and the role of the end product within the design process. This can be achieved by developing assessments that reflect 'real-life' scenarios with which students engage.

Method

The research aims to evaluate an innovative teaching approach used in a [removed for peer review] course. This teaching approach involves using Virtual Teams to develop student collaborative inquiry learning skills. Virtual Teams approaches will be used as the mechanism to embed Innovative Learning Environment principles in an online space, adapting a model developed by Carvalho and Yeoman (2018), which mapped the components of the set, epistemic,

social design and co-creation and co-configuration activities (see Figure 1) of a face-to-face model of learning into an online course.

Participants

Participants were recruited through their engagement as students enrolled in the [removed for peer review] during Semester 1, 2020. The majority of the student cohort were in-service teachers. Ethics was obtained through the university. Participants were invited to undertake an online survey using Qualtrics (Qualtrics, 2019) after their unit studies through an embedded link within the Learning Management System (LMS). Participants were asked to rate a series of questions from beneficial to not helpful (4 points scale) that evaluated the learning approach in the online learning space (see Appendix). There were 67 surveys submitted, with 24 of the responses being removed before data analysis due to being incomplete.

Most participants were female (84%), with only 2% of the sample indicating they were male. Interestingly, 14% of respondents preferred not to report on their gender. Participants' reported age ranges indicated that most of the students were between 30 to 49 years of age, representing 72% of the sample cohort. Also, only six respondents (14%) reported having no experience working in teams as a means of task completion at the tertiary education level. This is followed by twelve participants with minimal self-reported experience. Most of the sample (58%) indicated they had group work experience for a minimum of at least two years. 37% of respondents indicated they had extensive experience working in groups of five years or more (see Table 1 for demographic data).

Data Analysis

Rating means and standard deviations were calculated separately for each statement addressing the *Structure*, *Process*, and *Outcomes* aspects of the Virtual Teams model (as mapped onto the ACAD framework). Qualitative feedback collected within the survey was encoded through NVivo to identify the fundamental principles and values outlined within the digital tertiary NGLLE framework.

Results

Table 2 shows participants' results that indicated each of the seven elements associated with the *Virtual Teams model's structure aspects* was quite helpful as a learning tool to meet the course learning outcomes ($M = 3$). More noteworthy variation in responses was noted between the elements of home groups' use to minimize social isolation ($SD = 1.05$) compared with the provision of multiple modes of teaching materials ($sd = .77$).

Table 1

Demographic Characteristics of Participants

Variable	Category	N	% of sample
Gender	Female	36	84
	Male	1	2
	Prefer not to say	6	14
Age	20-29	9	21
	30-39	18	42
	40-49	13	30
	50-59	3	7
Online learning experience	None	3	7
	Minimal: 1-2 years	19	44
	Some: 2-5 years	15	35
	Extensive: more than 5 years	6	14
Experience working in task completion teams	None	6	14
	Minimal: 1-2 years	12	28
	Some: 2-5 years	9	21
	Extensive: more than 5 years	16	37

Table 2

Helpfulness of Structural Approaches within the Online Learning Environment in Descending Rating Standard Deviation Order: All Participants (n = 43)

Pedagogical Approach	Rating Mean	Rating SD
Home groups to minimize isolation	3	1.05
Ability to choose 'Expert Group' topic	3	0.95
Role of the lecturer/tutor as facilitator	3	0.93
Clear group behavior expectations	3	0.93
Support of a peer team	3	0.92
Ability to choose communication technologies	3	0.87
Multiple modes of teaching materials	3	0.77

In the rating of the seven elements associated with the *Process* aspects of the Virtual Teams model in Table 3 below, participants rated learning tasks that reflected real-life scenarios as very helpful ($M = 4$), compared with a rating of quite helpful for the remainder of the process elements ($M = 3$). Participants also demonstrated greater variance in response concerning skills development beyond the learning goals ($SD = 1.05$) compared with the value of learning through problem-solving ($SD = .82$).

Participants were asked to rate the helpfulness of the attributes associated with the *Structure* and *Process* elements on their perceived achievement of the unit's learning outcomes. Overall, participants rated the elements as quite helpful ($M = 3$); however, the mean rating demonstrated a significant variation level ($SD = 1.05$).

Thematic Data Analysis

Qualitative feedback collected within the survey from open-ended questions asked participants to comment on the benefits and challenges with the learning tools or features. The results were coded through NVivo (QSR International, 2020) to identify the key themes outlined within the digital tertiary NGLLE framework. The findings indicated themes that included student-

centered approaches to learning, experiential learning opportunities, real-world applications of learning, and sensitivity to individual differences (Istance & Kools, 2013).

Table 3

Helpfulness of Process (Learning Activities) Within the Online Learning Environment in Descending Mean Rank Order: All Participants (n = 43)

Learning Activity	Rating Mean	Rating SD
Learning tasks to reflect 'real-life' scenarios	4	0.77
Skills development beyond the learning goals	3	1.05
Team building through interactions	3	0.96
Opportunities to reflect on group work	3	0.92
Learning through collaborative group work	3	0.88
Critical thinking exercises	3	0.88
Learning through problem-solving	3	0.82

Both deductive and inductive reasoning was used through a thematic analysis approach, which considered themes based on the literature and the resultant interview data. The interviews were analyzed, and the responses were grouped into themes using the thematic analysis approach based on the recommendations of Braun and Clarke (2008) and Guest, MacQueen, and Namey (2012). The participants' open-ended responses were collated and thematically analyzed using the approach set out by Braun and Clark (2006). This approach involved an independent analysis to ensure reliability between the researchers. From these independent analyses, repeating 'trends' emerged from the data around the predefined themes. These themes could then be measured and identified with accuracy. The themes were then examined about the findings from the survey. Participants are referred to in the results by their transcription code: transcription number to maintain confidentiality. For example, Student 5 refers to the third response transcribed.

Student-centered Approaches to Learning

Within the category of student-centered approaches to learning, participants appreciated the multimodal aspects of engagement in the unit. For example, students appreciated the flexibility of topic choice in the multiple methods they engage in learning. These included access to readings, lectures, sessions engaging with their lecturer through the program Collaborate, and the option of choice and assessment task focus. Participants consistently commented that the structure of the course was "motivating," "engaging," and that the provision of choice was "empowering." Student 16 summed up the overall feedback concerning the *Structure* aspects of the course design and its alignment with student-centered approaches to learning, stating that "the flexibility in what we learned and how we learned it was really beneficial, especially because this then led to multimodal formats of assessment, so it really flowed through the course, which I think was important."

Experiential Learning Opportunities

Experiential learning opportunities and experiences are often overlooked or devalued, given there is a significant focus at the tertiary level on the achievement of assessable learning outcomes (Holmes, 2019). However, these serendipitous experiences often support a greater depth of understanding of key concepts, enabling students to connect the theoretical with real-world application nuances (Yeigh & Lynch, 2017). Examples of participants' experiential learning were evidenced through the survey feedback options. These included the development of greater self-confidence and working collaboratively with others to achieve a single goal. Such skills were identified by many of the participants as being a pivotal skillset within educational settings. Social constructivist methodologies were highlighted as fundamental approaches and learning about the self and gaining information around previously unknown topics. This is reflected in numerous comments, but most notably, it was stated that "teamwork provides knowledge of different opinions and contexts which can inform critical self-reflection; learning about an unknown topic from peers was highly beneficial" (Student 3). There was also consideration around applying and implementing many approaches in differing cultural contexts as Australian-based students worked in groups with students working internationally.

Real-world Applications to Learning

Participants experienced numerous benefits through the opportunities provided for real-world learning, a common theme that featured prominently in participant feedback. Of value were the real-life examples embedded throughout the course work and the practical applications for teachers highlighted within the assessment task choices. Participants noted that the alignment of the content and assessments to real-world scenarios encouraged greater critical thinking and supported meaningful collaborative dialogue and authentic learning opportunities. Participants

indicated that such scaffolding resulted in a greater understanding of the professional practice and high confidence and achievement levels within the summit of assessment tasks. Thinking about the theoretical and how that informs practical application resulted in "new learning critically." Practical examples provided to students through videos of real-life teaching scenarios provided "valuable insights" to scaffold the translation of "what" can be done to support student needs to "how" this can be achieved. Students' feedback supports the rating scale results, with students indicated that the most practical activities are associated with the process.

Sensitivity to Individual Differences

In this paper, it has been previously noted that there is a strong alignment between the categories of student-centered approaches to learning and sensitivity to individual differences. While student-centered approaches to learning were proactively planned for and addressed in the *Structure, Process, and Outcome* aspects of the Virtual Teams model, the efficacy of that planning to address the sensitivity to individual differences is more adequately measured through the qualitative feedback. In commenting on the challenges participants faced in undertaking the coursework, a common theme highlighted an inequity of technological skills, Internet connectivity, and the disparity of individual participants' abilities for engaging in online group work. For example, several students experienced issues with applications crashing, group discussions being disjointed, or discourse interrupted due to freezing from poor Internet connectivity. The choice of some programs such as Collaborate resulted in lower functionality than alternative meeting platforms as Zoom. Though students indicated substantial benefits in experiential learning through collaboration with colleagues in differing geographical locales, time management and the ability to connect in a virtual space with people in different time zones presented significant challenges in an online working group space. This feedback suggests that engaging in reflective feedback with students is essential in informing improvements of the structure and process elements required to address better sensitivity to individual differences in future iterations of the course delivery.

Intersections and Relationships between the Themes

There was a significant crossover in participant feedback between the coding categories of student-centered approaches to learning and sensitivity to individual differences. For example, in considering the structure of the course, one participant noted that they "had to print readings and course notes" (Student 11) because of their preferred learning style as they did not "tend to retain information" (Student 11) through collaborative discourse or through listening to recorded presentations. While this could be interpreted as being an issue relating to being sensitive to individual difference, the comments align closely with the application of the structural approaches,

which work to address multiple modes of representation, engagement, and learning that are often at the core of a student-centered approach to learning. This same coding approach was taken to analyze participant feedback separating individual differences and planned student-centered pedagogical observations and comments.

Learning Online as Impacted by COVID-19

In addition to these identified categories, a coding theme of learning online as impacted by COVID-19 was included to address the current climate. It now applies to the new needs of 21st-century learners during a pandemic.

A shift to online learning did not inform the implementation of the Virtual Teams approach because of the impact of COVID-19. However, it ultimately proved valuable in supporting student engagement and outcomes and the introduction of sound virtual education pedagogies. The modeling of such approaches is particularly valuable, given the course participants' feedback and perspective. In their initial reflection, they noted:

group work when you're a virtual course is always going to be challenging, and I don't feel mirrors real-life in a school - we work together in the same building, so we're able to have face-to-face meetings and work with each other that way, and not only online like this course (Student 37).

Student 9 noted, "an online course usually means people can't communicate with each other life, but they would be able to in the workplace. This was frustrating."

The benefits elicited through engagement in the Virtual Teams model during lockdown for participants related to a "decrease in the sense of isolation - which turned out to be very relevant" (Student 41). Nevertheless, some represented specific challenges due to their circumstances. Having to home-school their children with a found it was "not a very convenient way to work with the kids around at home because of distractions" (Student 6). Nevertheless, for the most part, students connected the value of learning in virtual spaces with the realities they faced in practice as students shifted from the physical classroom to learning online from home. For instance, as Student 17 described, "with the teaching from home, the tools used here were not a challenge, but pre-COVID-19 I would have struggled with knowing how to use the platforms". Such comments suggest that the students were not as familiar with virtual or online learning spaces as it did not reflect their professional needs. There is undoubtedly an emphasis on students engaging with Information and Communication Technology (ICT) and being proficient technological users. However, the value of upskilling as a means of experiential learning was communicated through student feedback. This is reflected in feedback around the challenge of learning how to use some

of the latest tools introduced in the course, "but what a great opportunity it was, as it made me realize that if I have challenges, my students might face the same challenges" (Student 27) when it comes to navigating online learning platforms.

Conclusion

Higher education is becoming transformed by rapidly changing societies' demands and the shifting expectations around what they expect institutions to provide. As universities evolve to meet the challenges, there is a fundamental emphasis on the reconfiguration of traditional teaching and higher education learning (Leal Filho & Pace, 2016). To better match this learning paradigm shift's demands, we have proposed a design for online learning that mirrors ILE's observed in face-to-face teaching and learning environments. This article illustrates how the framework of the ILE's can be mapped effectively into the online space. The current study described in the article provides results of a study using an online survey to investigate student perceptions of the course restructure. As the results have indicated, all course redesign components were reported as helpful as learning tools.

Additionally, tasks reflecting real-life scenarios were the most useful for learning outcomes. Structure and process were determined to be valuable contributors to satisfactory learning outcomes. Additionally, experiential learning examples were evidenced through the survey and included the development of greater self-confidence and working collaboratively with others to achieve a single goal. Further, participants experienced several benefits through the opportunities provided for real-world learning, a common theme featured in the survey reports. These benefits included a close match in their learning and their ability to apply it in their work context.

Participants' reported age ranges indicated that most of the students were between 30 to 49 years of age, representing 72% of the sample cohort, commensurate with current age demographics studying online across the institution (Stone, 2020). Moreover, student-centered learning approaches were proactively planned for and addressed in the *Structure*, *Process*, and *Outcome* aspects of the model. The efficacy of the planning to address the sensitivity to individual differences was shown in the qualitative results. New generation learning environment literature values group work that enables collaboration in the face-to-face environment in higher education (Tinto, 2003). This presents a challenge when students are learning online. It is suggested that the inclusion and careful implementation of Virtual Teams addressed this difficulty. While noting that Virtual Teams have been progressively used in higher education due to the increased use of technology with its potential to support collaborative learning and authentic learning tasks (Hu, 2015), it is vital to recognize its value as a mapping tool in this instance.

The study presented here concentrated on aspects of design and, as such, focused on structure and process. Findings relating to outcomes were found to cross over with aspects of the overall course design. For example, moving students into teams changed the outcome from an individual to a group product'. Concerning using the new model for online learning both during COVID-19 university lockdown and in the future, the findings show positive outcomes for connecting students with each other, and coincidentally, modeling the tasks that the student cohort (in-service teachers) were having to practice themselves, as schools moved into the online space. This brought a sense of relevancy to online delivery. In terms of teaching, once restrictions lift, the application of such a design continues to be relevant as moves to online learning continue in a post-COVID-19 world. Of note, however, students indicated that they were not necessarily prepared with the required ICT skills required. It would be worthwhile to scope the professional development needs that would address these concerns.

Limitations

There were several limitations to the current study. The first limitation was that the survey design could be improved by changing the questions from "how helpful was the following component of the course design" to "rate the component of the course design'. By doing so, comparisons could be determined that were not evident in the current results.

There was also the contradiction between indicating in the survey that students valued learning in groups compared with their open-ended question responses. They consistently reported the value of group work. In other words, while students did not highly regard group work as a helpful learning tool, it was commonly reported as a beneficial feature of the course. The survey design needs careful consideration to provide a more robust outcome to overcome future discrepancies in the results

A further limitation was that the research was designed to concentrate on the structure and process elements to gain feedback on the course design elements associated with the model. The survey questions can be refined to include more specific results regarding outcomes. Now that we have verified that Structure and Process are essential, should the study be repeated, we can improve the survey with a greater emphasis on student learning outcomes.

Implications and Recommendations for Future Research

The presentation of a new model in this paper serves to match Virtual Teams within online learning in a university environment. However, there are potential barriers that need to be recognized in developing any new learning model.

As Iannone and Simpson (2017) have reported, students may be resistant to alternative teaching methods and learning as they perceive 'traditional' teaching delivery as a more acceptable form. Tran, Oh, and Choi (2016) suggest that may contribute to this resistance is the self-belief that students will not be able to complete group tasks effectively and thus may be resistant to the co-operative behavior required to be successful. To minimize resistance, attempts were made to alleviate student concerns by adding a reflective task that allowed a moderation of marks should students in a group not contribute and allow for alternative means of assessment should students feel high anxiety levels regarding group work. An alternative assessment was included because it has been recognized that a 'one size fits all' assessment task does not account for individual differences (Rose et al., 2018). Practices of universal learning design were embedded, which allowed for as much flexibility in the delivery of assessment to be made and to ameliorate the possibility of isolating any particular student (Rose et al., 2018). As the results indicated, however, the survey findings showed that group work was considered helpful for students' learning and contributed to better outcomes than if students worked on individual tasks. As an aside, it might be worthwhile to mention that only four students chose not to work in a group or had to submit individual assignments due to extensions that did not allow them to participate in a group.

In conclusion, COVID-19 presented those studying in places of higher education with unique challenges never before experienced. The development of the project: *An Evaluation of Using Virtual Teams to Map Innovative Learning Environments into the Tertiary Learning Space* coincided with the university and schools' lockdown. It nevertheless presented an opportunity to meet and hopefully exceed the expectations of online learners both during the lockdown and into the future of online learning.

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Appendix

Project Survey : An Evaluation of Using Virtual Teams to Map Innovative Learning Environments into the Tertiary Learning Space.

Students will be asked to tick the relevant box for each question numbered below:

How helpful was the following learning tool or learning feature during the course?

Not helpful	A little helpful	Quite helpful	Very helpful
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1. Teaching materials using multiple modes (reading/ video/ lecturer presentation/ lecturer tutorial)
2. The ability to choose which topic I was going to study in the 'expert group'.
3. The role of lecturer as a facilitator rather than traditional lectures
4. Students learning through groupwork instead of individually
5. Students learning through problem-solving
6. The ability to choose the technology that we could use to communicate in groups
7. Group behaviour expectations set out
8. Critical thinking exercises
9. Opportunities for group interaction to develop a sense of 'team'
10. Home groups to lessen the feeling of isolation
11. Learning tasks that reflected 'real life' situations
12. The lecturer to assist my learning and the running of the course
13. The support of my team
14. The ability to choose my group and topic for Assessment 3
15. Opportunities to reflect on our teamwork
16. To learn skills that were beyond the learning outcomes of the course.

Please list these skills:.....

17. Students learning using all or many of these features to achieve better learning outcomes

The following questions are to be answered in text.

- A. Do you have any comment about the **benefit** you found with these learning tools or features?
- B. Do you have any comment about the **challenges** with these tools or features?

Students will be asked to tick the relevant box for each question numbered below:

How helpful was the following learning tool or learning feature during the course?

Not helpful	A little helpful	Quite helpful	Very helpful
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18. Teaching materials using multiple modes (reading/ video/ lecturer presentation/ lecturer tutorial)
19. The ability to choose which topic I was going to study in the 'expert group'.
20. The role of lecturer as a facilitator rather than traditional lectures
21. Students learning through groupwork instead of individually
22. Students learning through problem-solving
23. The ability to choose the technology that we could use to communicate in groups
24. Group behaviour expectations set out
25. Critical thinking exercises
26. Opportunities for group interaction to develop a sense of 'team'
27. Home groups to lessen the feeling of isolation
28. Learning tasks that reflected 'real life' situations
29. The lecturer to assist my learning and the running of the course

30. The support of my team
31. The ability to choose my group and topic for Assessment 3
32. Opportunities to reflect on our teamwork
33. To learn skills that were beyond the learning outcomes of the course.

Please list these skills:.....

34. Students learning using all or many of these features to achieve better learning outcomes

The following questions are to be answered in text.

- C. Do you have any comment about the **benefit** you found with these learning tools or features?
- D. Do you have any comment about the **challenges** with these tools or features?