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Using Interactive Online Pedagogical Approaches to Promote Student Engagement

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Abstract: The COVID-19 outbreak in late 2019 required a complete shift to online learning across all educational institutions, including universities. The rapid transition to online learning globally meant that many educators were suddenly tasked with adapting their classroom-based pedagogy to the online space. While this was undoubtedly challenging for teachers and students, it also opened up possibilities for reimagining the delivery of content, along with creating increased access for students who had barriers for studying remotely before the impact of COVID-19. The study discussed in this paper examines the experiences of students studying at a regional Australian university that already offered online courses, and whose instructors were already using a diverse range of online delivery tools. Specifically, the study sought to investigate how instructors used interactive strategies to promote student engagement, and how the interaction between learner and content influences student engagement. With research showing that online students typically have higher attrition rates than their on-campus counterparts, engagement has been identified as an important factor in online learning. Online interaction in particular is considered to be instrumental in influencing student engagement and positively impacting student satisfaction, persistence, and academic performance. Data collected from interviews conducted with two different cohorts of students, studying two different courses (mathematics education and Chinese language) at the same university, demonstrated ways instructors utilised interactive online pedagogies to engage students with potentially challenging course content. The study has implications for online educators who are looking for ways to adapt their on-campus courses to online delivery, with a focus on engaging and maintaining online students' interest and ongoing participation in their courses.

Keywords: online learning; higher education; engagement; interactive strategies

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1. Introduction

The impact of the COVID-19 situation has led to an increased uptake of online learning by students, both nationally and internationally. As a result, higher education instructors have been tasked with engaging online students, designing online materials, and communicating and interacting with students in mostly asynchronous ways. Universities' teaching staff were required to adapt their courses to online versions to cater to students who could no longer attend on campus. Many continued to offer online courses and/or blended learning models, even when on-campus study resumed (Hamer & Smith, 2021; Martin, 2020) [1,2]. This increased availability of online learning has enabled wider access and participation internationally and nationally in higher education in Australia for a diverse range of students. Issues of engagement, participation, commitment, integrity, and quality, however, continue to be concerns when discussing online learning (Kehrwald & Parker, 2019) [3]. It is often assumed that providing online digital tools for learning will have a positive influence on student engagement, yet student engagement is reflexive and based on individual goals (Kahn et al., 2017) [4]. Online learning offers flexibility and convenience,

giving students the opportunity to balance study with other demands and responsibilities (Stone et al., 2016) [5]. Attrition rates remain a concern for online students. In 2017, for example, Australian online students in the higher education sector had an attrition rate of 29.64%, compared with an on-campus rate of 12.23% (Department of Education, Skills & Employment, 2018) [6]. Research indicates that the convenience offered by online study is diminished by negative factors such as a lack of interaction with tutors and other students, problems with instructional materials, technical problems, and challenges of work, health, and family commitments (Greenland & Moore, 2014; Ilgaz & Gulbahar, 2015) [7,8]. Feelings of alienation, perceived lack of relevance, and the drudgery of study have also been identified by students as impacting on the quality of the online learning experience (Wimpenny & Savin-Baden, 2013) [9]. A strong teacher presence (Stone, 2017) [10] and course design that "engages and connects students with their teacher, other students, and the course material" (Stone, 2017, p. 39) [10] can mitigate some of the negative issues associated with online learning, at least in the Australian context.

Contemporary views about online learning highlight the disconnect between the 'new' flexible learning, and the traditional or established approaches to teaching and delivery (Kehrwald & Parker, 2019) [3], such as on-campus one-hour lectures. The increase in online learning has necessitated a shift in teaching approaches, but such shifts require an understanding that on-campus-appropriate teaching pedagogies are not equally effective in the online environment. Historically, without training, instructors are inclined to replicate existing course design and pedagogical practices when they move from face-to-face delivery to blended or online instruction (Bonk & Dennen, 2003) [11], without capitalising on the dynamic nature of a technologically enhanced teaching and learning environment (Redmond, 2011) [12].

Dissatisfaction and concerns about the efficacy of online delivery have also been raised by instructors who may be facing "overwhelming and downright frustrating" technical and pedagogical challenges in designing, developing, and delivering engaging experiences (Stott & Mozer, 2016, p. 152) [13]. There are also concerns about the quality of online teaching provided, in that, despite the advancements in technology, pedagogy, and practice, there is widespread variability in practice (Kehrwald & Parker, 2019) [3].

It is recognised that the instructor, and in particular, learner–instructor interaction, is a significant predictor of student satisfaction, engagement, and achievement in online learning (Martin et al., 2018) [14], and this has been identified globally during the COVID-19 pandemic (e.g., Roque-Hernández et al., 2021; Alla et al., 2022) [15,16]. In a study that investigated award-winning online teaching practices, expert instructors were characterised as understanding what worked in the online format, having confidence in online teaching, not being limited by technology, and knowing how to adapt materials for an online format (Kumar et al., 2019) [17].

Kehrwald and Parker (2019) [3] recently highlighted the need to utilise evidence-based academic practice to improve online learning, with innovative and progressive features of contemporary university online learning and teaching, such as those documented in case studies. The study discussed in this paper answers that call. It draws upon Moore's (1993) [18] and Martin and Bolliger's (2018) [19] subsequent construct of instructional strategies to demonstrate how interactive online pedagogies can be used to promote interaction between learner and learner, learner and instructor, and particularly learner and content. Two case studies were selected to illustrate the impact of the instructor on engaging learners with challenging content material and how this can be achieved in a fully online environment. Specifically, the study sought to address the following research questions:

1. In what ways do two online instructors use interactive pedagogical approaches to engage their student cohorts with learning challenging course content?
2. What are these online students' perceptions of the impact of these approaches on their learning and engagement?

It is anticipated that documentation of these case studies will be of relevance to course developers and higher education institutions who are looking to improve their online

course offerings, and provide better student support, experiences, and outcomes, which will ultimately lead to an increase in student retention. In addition, online instructors who may be finding the transition to online pedagogy challenging will gain insights into how course content can be creatively adapted to accommodate online delivery and teach core content, while still maintaining student engagement.

2. Literature Review

This section examines the literature related to the role of the instructor in designing and delivering courses that foster student engagement. The design of blended and online courses requires a different pedagogical approach to that for on-campus delivery. Engaging students in a digital world can be challenging, so a number of pedagogical frameworks have been proposed to support effective student engagement in online learning (e.g., Redmond et al. 2018) [20]. Effective online delivery utilises a range of digital tools and approaches, and multimedia has been shown to increase student engagement and learning (e.g., Martin & Bollinger, 2018; Martin et al., 2018) [14,19].

2.1. Instructor Presence

It has been suggested that instructor presence is essential to the success of online courses (Martin et al., 2018) [14]. This has been particularly important during the COVID-19 pandemic, where teacher presence has been found to have a positive impact on student engagement and learning (e.g., Rapanta 2020) [21]. Teacher presence may be perceived differently by educators and students in an online environment (Wang et al., 2021) [22], however, if implemented effectively, teacher presence is perceived by students as highly beneficial to learning (Martin et al., 2018) [14].

Research findings consistently show that instructor presence enhances students' motivation to learn, increases the depth and quality of students' interactions and discussions, and can reduce a sense of loneliness (e.g., Martin et al., 2018) [14]. Instructors and subjects that stimulate interest have a positive effect on engagement (Park & Choi, 2009) [23], with previous research conducted in this area showing that "it is the presence and behaviour of the lecturer, rather than peers, which is key to student engagement online" (Muir et al., 2019, p. 12) [24]. Instructor or teaching presence is theorised to consist of three components: instructional design, facilitation, and direct instruction (Anderson et al., 2001) [25]. Research findings indicate that instructional design, and clearly defined roles of instructors, are critical in facilitating cognitive presence, particularly in online discussions (e.g., Garrison & Cleveland-Innes, 2005; Gasovic et al., 2015; Garrison, 2016) [26–28]. Collaboration is also key to successful instructor presence in both online and blended learning frameworks (Vaughan et al., 2013) [29].

Instructors can utilise facilitation strategies to enhance instructor presence and instructor connection (Martin et al., 2018) [14]. Martin et al. (2018) identified twelve different facilitation strategies that influenced engagement and learning in the online environment [14]. The facilitation strategies were aligned to four dimensions: social, managerial, pedagogical, and technical. These strategies include aspects such as video-based instructor introductions, instructors' presence in discussion forums, interactive visual stimuli, instructors' use of various features in synchronous sessions to interact with students, and instructor-created content in the form of short videos/tutorials.

2.2. Use of Multimedia

Multimedia technology empowers education, providing opportunities for interactions between teachers, student, and content that are flexible and authentic (Almara'beh, et al., 2015) [30], with digital tools often providing simulation opportunities to enhance learning (e.g., Vagg et al., 2020) [31]. Using multimedia in online courses has been shown to have a positive impact on education (e.g., Kostolanský et al., 2019) [32] and increase student engagement and learning (e.g., Martin et al., 2018) [14]. King (2014) [33] found, for example, that mini-videos and screen-casting that make instructors more visible had

pedagogical benefits, and video-based instructor introductions can help form relationships with instructors, resulting in more positive course evaluations (Jones et al., 2008) [34]. Mobile and digital technologies can offer considerable benefits and affordances within learning environments, such as building and supporting creative, collaborative, critical, and communicative capacities (Cobcroft et al., 2006) [35]. Inclusion of media tools or interactive videos (Havice et al., 2010) [36] may stimulate learners' motivation to learn and in turn increase student interaction with course content; however, it has often been observed during the COVID-19 pandemic that instructor unfamiliarity with digital tools may dampen student learning (Chu et al., 2021) [37].

Videos have been recommended as a medium for building social, cognitive, and teaching presence (Di Paulo et al., 2017) [38], with asynchronous video being effectively used to develop students' perceptions of teaching presence and immediacy (Crawford, 2018) [39]. This may be particularly relevant to language learners. Within online engagement literature, research suggests that students' exposure to a web-based learning platform (a virtual world) in the target language helps to reinforce their linguistic, pragmatic, and intercultural development, as they learn to navigate and comprehend the target language and culture through real-world tasks (Grant et al., 2013; Henderson et al., 2012). [40,41] The virtual world can provide opportunities for success in an environment that minimises unhelpful anxiety about foreign language production (Lin et al. 2014) [42]. This kind of learning activity offers particular benefits for beginning learners, who have not yet integrated large numbers of fluent speakers of the target language into their social networks (Pasfield-Neofitou et al., 2016) [43].

Use of multimedia has also been shown to result in more active contributions to discussion boards (Martin et al., 2018) [14]. Discussion boards provide the primary forum for learner–learner and learner–instructor interaction and can be an important tool to foster student engagement (Baldwin & Sabry, 2003) [44]. Although a sense of online instructor presence is essential to enable positive learner–instructor participation (Shea & Bidjerano, 2010; Chen et al., 2019) [45,46], both students and instructors have been critical about the quality of interaction and content in online asynchronous discussion forums (Thomas & Thorpe, 2019; Douglas et al., 2020) [47,48]. While there is little agreement about what constitutes instructor presence in terms of minimum numbers of postings, recommendations include starting major discussion threads, narrowing down topics, and responding promptly to students' posts (Martin et al., 2018) [14].

In summary, the research literature depicts instructor presence as being key to student engagement, with the expectation being that instructors utilise a range of engaging strategies, including the use of multimedia, to facilitate learning. What is less evident from the research is accounts of actual case studies which illustrate and document how instructors utilise these strategies within the context of different discipline areas. The research described in this paper builds on the existing research which highlights the importance of instructor presence through describing accounts of how this is enacted in practice and the impact it had on students' engagement.

3. Theoretical Framework

Moore (1993) [18] identified three types of interaction that foster student engagement: learner–learner, learner–instructor, and learner–content. Other researchers have used this construct to understand how online learners can be assisted to be more active and engaged (e.g., Lear et al., 2010; Martin & Bolliger, 2018) [19,49], and we used this framework as a tool for analysing the data for the study discussed in this paper. Figure 1 shows the types of interactions, based on Moore's (1993) [18] framework and adapted by Martin and Bolliger (2018) [19].

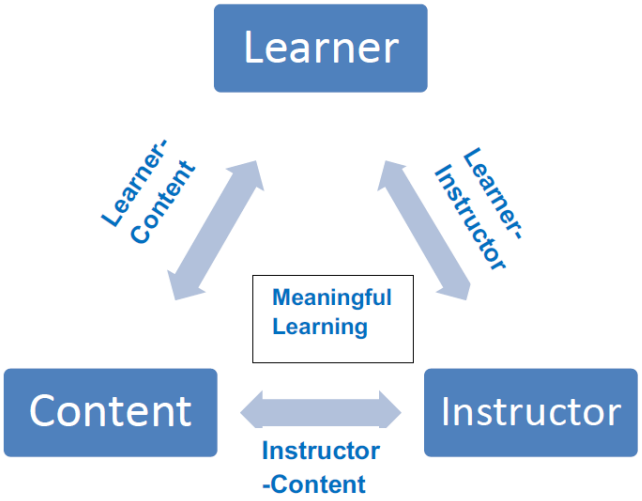

Figure 1. Types of interactions.

Learner–learner interaction refers to the opportunities provided for students to learn from one another through the exchange of resources, discussion, sharing of experiences, and ideas (Bolliger & Martin, 2018) [50]. Learner–learner interaction can be facilitated by strategies such as constructing interactive introduction activities at the beginning of a course, utilising videoconferencing or chat rooms, and using discussion boards. Such activities can assist students with feeling connected and can create a dynamic sense of community (Martin & Bolliger, 2018) [19].

Learner–instructor interaction in the online environment can be enacted through the instructor modelling online behaviours and establishing presence through creating and facilitating online discussions (Bolliger & Martin, 2018) [50]. Rapport and collaboration between students and instructors are important influencers in student engagement (e.g., Martin & Bolliger, 2018; King, 2014) [19,33]. Studies show that students who have a strong connection with their instructors achieve good learning outcomes and are more confident than those who consider their instructors to be less supportive (e.g., Creasey et al., 2009) [51].

Learner–content interaction refers to the way in which students engage with instructional materials and planned activities. Learner–content interaction can occur when students are watching instructional videos, interacting with multimedia, and searching for information (Abrami et al., 2011) [52]. It is recommended that online instructors make the content come alive using appropriate technologies and be critical when choosing material and content (Revere & Kovach, 2011) [53]. Course management system features, and effective communication and course facilitation strategies, have all been shown to engage online students (Dixson, 2010) [54].

To date, there has been a lack of research on learner–content interaction (Bolliger & Martin, 2018; Xiao, 2017) [50,55], with most studies focused on the first two interaction types. Learner–content interaction is crucial for learning in any environment, with Xiao (2017) [55] suggesting that further investigation into how students interact with content is required. The study discussed in this paper addresses this need through its focus on learner–content interaction and how this interaction is facilitated by the instructors in two cases. The cases were selected as they both involve the teaching of challenging course content through the utilisation of facilitation strategies and showcase what innovative pedagogical approaches are possible in completely online environments.

4. Methods

The research reported in this paper was part of a larger cross-disciplinary ethically approved study undertaken by researchers from a regional Australian university who investigated the use of interactive pedagogical designs in online courses. The study was given institutional ethical approval in 2019, with permission to publish results from smaller

elements of the research. This paper focuses on the qualitative data collected from online students enrolled in two units taught by the researchers during 2019. These data were from semi-structured, in-depth interviews with students and instructors undertaken during 2019–2020, as well as anonymous university-solicited student evaluation data (eVALUate comments) submitted to the university teaching and learning administration by students from the researched units at the conclusion of semester instruction. The use of both forms of qualitative data enabled data triangulation, to strengthen the legitimacy of the study findings (Bryman et al., 2008; Flick, 2018) [56,57].

4.1. Interview Data

From a total population of 80 and 60 online students, respectively, 9 students from the first subject (Teaching Primary Mathematics) and 4 students from the second subject (Introduction to Chinese) were interviewed. Interviews were conducted face-to-face, by phone and video call, and lasted between 30 and 45 min. They were digitally recorded, fully transcribed, and member-checked by participants for accuracy. The interview samples were not probability-based (Kohler, 2019) [58]. Participants volunteered to be part of the study, and not every member of the population had a chance of being included. The small sample size of interview participants limited generalization and transferability of the study results. However, it is submitted that the research provides useful insights into pedagogical tools which can support online student engagement.

To ensure that the results were not compromised by the learners' participation in courses taught by the researchers, potential interview participants were identified by the researchers and contacted after completion of the semester by the study Research Assistant. Students who had actively engaged with the pedagogical strategies implemented by the researchers in the focus units were offered the opportunity to discuss their experiences in an interview. This purposive sample (Denieffe, 2020) [59] ensured that participants had experience and first-hand knowledge of the teaching and learning strategies being investigated. Interested students self-selected and participated voluntarily.

4.2. eVALUate Data

In addition to the interview data provided by participants, this study also collected relevant qualitative data from eVALUate comments submitted by students from the two focus subject units. All students enrolled in the units were advised at the start of semester that their anonymous eVALUate comments may be utilised for this research and were afforded an opportunity to refuse such use by directly contacting the study Research Assistant. Instructors did not have access to any student decisions as to the inclusion of their data and were privy only to anonymised comments. No student refused use of their eVALUate data. eVALUate data were received from 25 students (40% response rate) for Teaching Primary Mathematics, and from 21 students (33% response rate) for Introduction to Chinese.

4.3. Data Analysis

Interview transcripts and student eVALUate comments were fully de-identified before analysis and were analysed using a thematic analysis process with constant comparison (Terry et al., 2017) [60]. This approach, which adopts pragmatic abduction (combining both deductive and inductive logic), enabled the researchers to consider the data in light of pre-existing themes identified from the literature, while at the same time being sensitive to new patterns that emerged during the analysis (Earl Rinehart, 2021) [61].

The qualitative data reduction involved the systematic allocation of codes to the data which were subsequently developed into higher-order themes (Elliott, 2018) [62]. Initial codes were assigned to words, phrases, and sentences in the text material that seemed to "stand out" (Bryman et al., 2008, p. 298) [56]. As the data were continually reread and compared, those descriptive topic codes were replaced with more abstract categories (Kennedy, 2016) [63]. The data were then examined to identify the emergent

interconnections and patterns. Corresponding patterns were placed together, and direct quotes were identified from the data to illustrate the categories (Bryman et al., 2008; Genapathy, 2016) [56,64]. The patterns within the data were then examined for overarching themes, operating at a higher level of abstraction again, and data were gathered under those themes (Belotto, 2018) [65]. Throughout the qualitative analysis process, the researchers remained mindful of the research questions for this study which helped to shape their subjective decisions in coding and categorising the data (Vaismoradi et al., 2013) [66].

Initial coding of the qualitative data focussed on the online pedagogical strategies and teaching tools employed in the two instructional units. That was subsequently refined based on the needs reported by students for online learning support, conceptualised as academic, social, and pastoral support domains. The strategies and tools utilised by the unit instructors were further coded in relation to online student support, with additional filtering in relation to such support reflecting engagement through student–teacher, student–student, student–self, and student–learning content interactions.

5. Results

5.1. Case Study 1: Teaching Primary Mathematics

Learning content for the subject 'Teaching Primary Mathematics' was presented to students weekly through the university online learning management system. It typically contained a narrated PowerPoint presentation or lecture, required readings, and activities. There was an expectation communicated by the instructor that students would progress through the learning content at their own pace and contribute to the discussion board topics for that week. The following results include excerpts from student interviews that provide insights into the ways the lecturer attempted to engage students with the content, and the impact this had on their learning.

5.1.1. Engaging with Content through Activities

Each week, students were provided with a variety of activities that helped to demonstrate or reinforce mathematical understandings, and skills, related to that week's topic. For example, in Week 4, students were asked to play 'Nasty Games' (a game involving throwing a dice and designating the numbers thrown with the value of ones, tens, or hundreds) with their peers or children to develop an understanding of place value:

> "There were certain things that she would have us maybe experiment with the children that we had, so my kids were my guinea pigs. You know, 'Can you solve this? What do you think about this?' kind of thing. So, it was, on a personal level, it was simple enough that I could do it on a week to week, I could use my kids as well in it. So, I could learn about how they saw it and how I understood it kind of a thing."
>
> (Jasmine)

> "I really enjoyed the questions [and] weekly activities that the lecturer gave us . . . She really encouraged the whole thinking out of the square, and not just doing formal algorithms, explaining how you would solve a problem. I really enjoyed that because it just proves that there's not a right way to do a maths problem . . . and reading how the other people solve their problems was really an eye-opener. Every week I jumped on [to the discussion board] to see what other people had done, or how they'd solved the problem to compare it to how I had."
>
> (Patricia)

A regular feature each week involved the opportunity to 'Let's do some maths', where students worked individually to solve a challenging problem or puzzle, and then posted their response to the discussion board. For example, in Week 3, students were asked to solve the following problem: It takes 3 $\frac{1}{4}$ hours to ride from Melbourne to Geelong. It takes $\frac{1}{2}$ an hour longer to ride from Melbourne to Werribee than it takes to ride from Werribee to Geelong.

How long does it take to ride from Melbourne to Werribee? Feedback from the students indicated that they enjoyed the opportunity to actually engage in some mathematics:

> "I think I really liked the fact that it was not just all the theory stuff, you know, knowing harder teachings, but also she had us do some Maths . . . So, I really liked that. Just that, I don't know, to me it was like, a bit of fun."
>
> (Kayla)

> "I was really, really happy with the way it was set out in terms of, it wasn't all reading nor all lectures, and only very, very short lectures, and then there were videos and quizzes, and resources, and it was a lot of different things, which kept it interesting."
>
> (Lisa)

5.1.2. Engaging with Content through Multimedia

Each week the instructor prepared an overview video which showed her talking to the camera about what to expect and focus on in that week's topic. Students appreciated the inclusion of the videos, as the following comments illustrate:

> "I like the fact that every week, there was an introductory video which was current . . . it made you feel like you were having a conversation with her, and she was talking about things that had actually happened the week before."
>
> (Kayla)

> "I made sure those videos were the first things I watched every week before I did the rest of the content. I thought they were a really good overview, but I think, all over, it could've been a bit more focussed on . . . Like, maybe just even a couple of minutes explaining how to approach the maths before we learn how to teach it, if that makes sense . . . But, yes, I did watch those videos."
>
> (Lisa)

> "I thought they were good . . . I like the idea of having an instruction video because it set the tone for the week. Especially . . . some of the content was incredibly new for me. The introduction video was at least a way to comprehend the whole week's work."
>
> (Marissa)

In addition, the learning content usually included links to online videos, such as TED talks, or videos produced by the instructor to demonstrate mathematical concepts or skills. For example, one short video showed the instructor playing a game of TenziTM to demonstrate probability concepts. Another showed a step-by-step guide to using MAB (multi-based arithmetic blocks) to solve an addition algorithm. In this way, the videos provided an opportunity for online students who could not attend on-campus classes to see modelling of materials or participate in game-playing.

> "The videos were good for me because when it comes to math . . . it was not my strength, it really wasn't my strength growing up . . . I was like, 'Oh my God. This was something I learned about 100 years ago or something,' . . . So, the videos really helped. I could go back and I could be like, 'Oh, is that how they do that?' . . . So, all these physical equipment that they use, it was good to see what it looks like and how they can manipulate them and things like that, so the videos were the best for me."
>
> (Jasmine)

> "I know sometimes I've got to interpret words or activities in my own way. But if she demonstrated it, then you know exactly what she was talking about."
>
> (Oscar)

5.1.3. Engaging with Content through Discussions

Discussion boards were the primary forum for students to respond to the learning content. Each week, the instructor presented three or four suggested discussion topics and the students could choose to respond to any or all. There was an expectation that students would continue to build on discussion threads that were created, rather than starting new ones. Student feedback showed that, in addition to discussing more general topics, students were also able to use the forum to focus on content-related discussions:

> "I had completely forgot how to do fractions, for example. And so, it was really good to read other people's posts, and I was like 'Oh right! That's how you do it. I forgot that rule.'"
>
> (Harry)

> "I think that it is important to have that discussion board because sometimes when you have absolutely no idea what that particular topic was about, you can go and you can see what someone else has written and be like, 'Oh yeah. That makes sense.'"
>
> (Jasmine)

> "I like how the lecturer encouraged us to think outside the square. There's no right way or wrong way to do things, as such. So, I posted weekly with explanations and trying to get the way that I do maths across to the other students because I think that I do it a little bit differently to other people."
>
> (Patricia)

The following comment, however, demonstrates that perhaps not all students felt comfortable with posting to the discussion boards, and highlights the limitations associated with relying on discussion board contributions:

> "Maths does have a right and wrong answer, even though we're being taught that there's a number of ways to get to answers . . . We felt a bit stupid. We didn't want to make mistakes because there were people there that were quite capable . . . Our contributions were sort of making us . . . feel a bit inadequate."
>
> (Marissa)

5.1.4. Summary of Results for Case Study 1

This case study examined the relationship between the learner and the content through a wide range of interactive strategies in a Teaching Primary Mathematics course. The results show that the instructor used a variety of strategies, such as overview videos and interactive activities, to effectively engage the learner with the content of the course. To engage learners and maintain their engagement, the instructor was cognizant of making the content relevant and interactive, and maintaining a consistent instructor presence throughout the semester, even though online activities were often asynchronous.

5.2. Case Study 2: Introduction to Chinese

As in the first case study, learning content for the subject 'Introduction to Chinese' was traditionally outlined in a weekly schedule through the University's learning management system. The weekly content consisted of a series of short lecture and tutorial videos along with accompanied notes in PDF format, selected digital learning tools, various types of learning activities, discussion areas to share learning experience and resources, and self-reflection on learning for that week. It was anticipated that students would self-pace their learning throughout the semester by engaging with the weekly content in their own time.

Interactions are the central emphasis in language learning (Lin et al., 2017) [67]. The integration of a wide range of interactive strategies, therefore, was a deliberate approach designed to scaffold content structure to make Chinese language learning manageable and successful. A student interviewee commented on this approach:

> "I think that having a range of different resources is really important for online and I like things being kind of bite-sized so that you don't necessarily have to sit down and watch a 50 min lecture but making things a bit more modular is really beneficial in the online space."
>
> (Natalia)
>
> "There's a lot of content online and I know some students don't really use it, that extra content, you know, and I'm probably specifically talking about Chinese, you know, Lecturer puts up videos and all this extra little stuff there for us."
>
> (Olivia)

Benefits of the approach were also identified in post-learning evaluation by students:

> "The unit [subject] helps me understand the basics of the Chinese Language and build a proper foundation. The interactive questions in the modules which give me a chance to test my learning."
>
> (Student, eVALUate comment)

5.2.1. Engaging with Content through Digital Tools

Compared to European languages, learning Chinese requires relatively large cognitive adjustments to sounds and forms of writing (Orton, 2010) [68]. Two digital tools were used to assist beginners in learning the Chinese language phonetic system and character writing. One tool was a "Chinese Writing Skills CD" (later converted to a web page) developed by the instructor, featuring animation, audio, and text (see Figure 2). It included a printable vocabulary list, and seven modules on the fundamentals of Chinese writing. The resource enabled beginners to independently practise and improve their Chinese writing and reading skills. The feedback from students was very positive. For example, a first-year student stated: "I have used almost all of the components and think this is a great resource for helping students to better learn Chinese." (Student, personal communication).

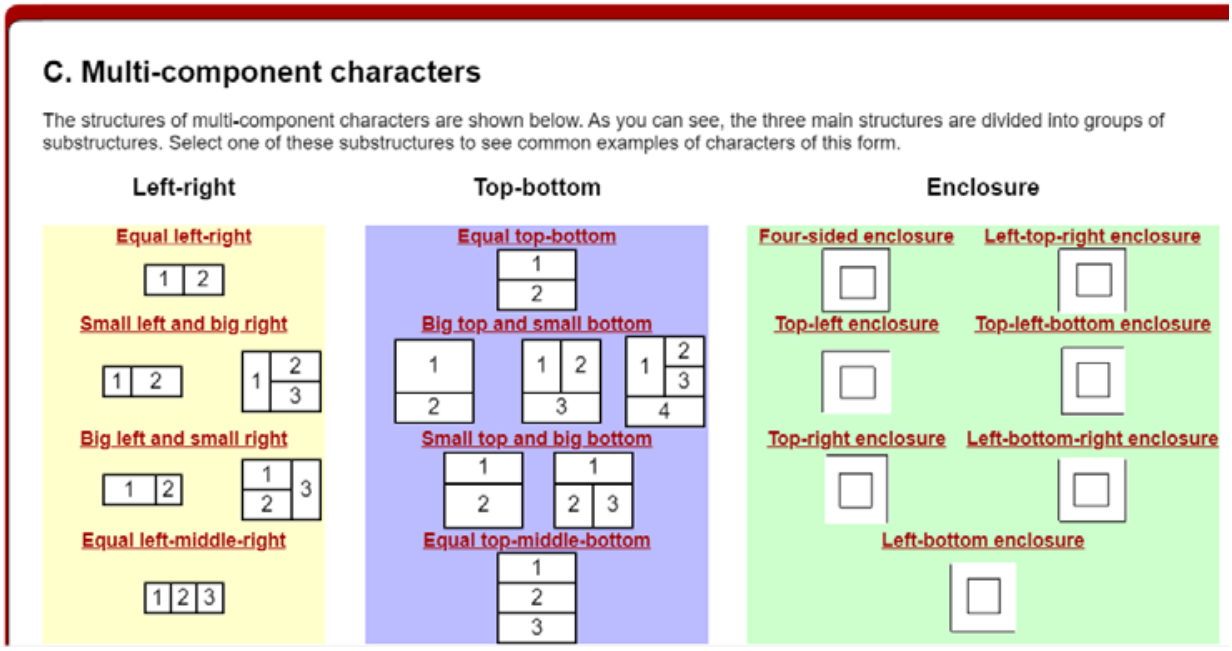

Figure 2. A snapshot of Chinese Writing Skills CD. Reproduced with author's permission.

The other digital resource used in the subject was an e-learning tool: "Mastering Mandarin Pronunciation Through E-learning" (Yeh and Chen, 2010) [69], that helped enhance the students' acquisition of Chinese pronunciation. A student stated: "The tool allows for more interactive learning which increases time spent studying Chinese, so it is definitely beneficial for this beginner Chinese unit." (Student, eVALUate comment). Specifically, all learners agreed that this tool was visually attractive, easy to follow, interactive, and engaging. As one student observed: "Words and buttons are spaced out and large, making it easy to use." (Student, eVALUate comment).

5.2.2. Engaging with Content through Multimedia

To connect language to the real world, a range of authentic materials were incorporated into the learning content. These included short video clips with a focus on words, grammar, and sentence patterns, and the use of an immersive 3D virtual world. Students acknowledged the effectiveness of the short video clips: "Through the use of short videos, the teacher ensures that lectures and tutorials are always fun and interactive." (Student, eVALUate comment).

Chinese Island (Monash University, 2007) [70] is an extant immersive 3D multiuser virtual world (MUVW) created in Second Life, developed by a major urban Australian university. It enables students to use Chinese language in an environment resembling real-life geographic locations and simulate real-life experiences (Peterson, 2011) [71]. The virtual environment allows users to engage in cultural experiences such as dining in a restaurant and visiting markets and streets, with sounds and music enhancing the reality of the experience (see Figures 3 and 4).

Figure 3. "Mohai Academy", Chinese Island image featuring stone lions. Reproduced with the creator's permission.

Figure 4. Chinese Island image showing marketplace. Reproduced with the creator's permission.

Chinese Island was deliberately chosen as a tool for learners to develop language acquisition, based on recommendations from research that the virtual world can assist with alleviating anxiety about foreign language production (Lin et al., 2014) [42]. By adapting task-based language-learning methods to a 3D MUVW environment, the learning tasks were a combination of learnt textbook-based content with authentic scenarios, and new content from real life. It provided students with the opportunities to internalise their learning through revision, practice, consolidation, and extension. Immersion in this virtual world had a positive impact upon students' learning, as the following interview quotes illustrate:

> "When you go into this space on the computer, online, it's very immersive . . . it's virtual technology . . . you can imagine, and you can see the streets and all the signs and there's the markets. And there's all these little experiences that you wouldn't have been able to have any other way. There are those little things that you get to learn about the culture from a—yeah, in a native way, not so much a tourist, you know, and also within that island you also can increase your language skills by engaging in conversations."
>
> (Olivia)
>
> "I think as a beginner, vocabulary is one of the most important things. Being able to click on objects and retrieve the vocab/further info was something I found quite useful, which complemented my more 'traditional' approach to learning."
>
> (Darren)
>
> "It helped reinforce what I'd already learned, and it taught me new characters as well."
>
> (Kathleen)

5.2.3. Engaging with Content through Instructor Interaction

In addition to interacting with students as they navigated their way through Chinese Island, the instructor also made use of discussion boards. The purpose of the discussion boards was to provide an opportunity for students to engage in dialogue with the instructor

and other students beyond any synchronous opportunities. It also allowed for prolonged engagement with the content, as students could return to the forum over days, or even weeks. The uptake from students was mixed, with feedback not always positive:

> "The second you put all these discussion boards and all the rest of it open for everyone to see, you're kind of like—which is weird because in real life, we don't have a problem often conversing with one another, but then the second it's online, it's almost like there's that kind of stigma of the oversight of the lecturer, I can't say what I want to be seen and it's there forever and things like that. I think it's a difficult problem."
>
> (Andre)

> "Sometimes I think they're not people's real opinions, they're what they want people to think they think. I think there's all a falseness that goes on in discussion boards or what the lecturer wants to hear. There's a lot of conformity around."
>
> (Olivia)

Adoption of a more personal approach, including regular individual emails and phone conversations, assured students that the lecturer was accessible and cared about their learning. The following quotes demonstrate that students appreciated the individual support provided:

> "For some reason I couldn't attend that first lecture, but—and I've never received an email from a lecturer before that said 'I was expecting to see you today. Are you coming tomorrow?'"
>
> (Olivia)

> "I guess for me, the kind of accessibility to interacting with lecturers, I think, is something I value in lecturers, approachable, personable . . . even if it's outside of consultation times or whatever—generally being accommodating and trying to work with you to get whatever outcome you're working towards is something I've personally really valued."
>
> (Andre)

5.2.4. Summary of Results for Case Study 2

This case study examined the relationship between the learner and the content through a wide range of interactive strategies in an introductory Chinese language subject. The results suggested that students perceived these types of interaction as having a positive influence on their learning. The use of an interactive multimedia platform, Chinese Island, was most beneficial for learners to study Chinese language. It provided opportunities for students to interact with objects and non-player characters, reflecting 'real language' and 'real life' in the target language environment.

6. Discussion

6.1. Instructors' Use of Interactive Strategies

Both case studies illustrate how the instructors utilised a variety of interactive pedagogical approaches to engage online learners with the learning content. In the Teaching Mathematics subject, for example, games and activities were used to foster students' engagement with mathematical content, by requiring them to interact with children or peers. In addition, reporting or sharing the experiences through discussion boards provided opportunities for learner–instructor and learner–learner interactions to occur (Moore, 1993) [18]. Similarly, the provision of digital tools, multimedia, and the Chinese Island 3D MUVW allowed beginning Chinese language students to engage with language learning in creative and novel ways. This finding is consistent with other literature which shows that the use of multimedia particularly stimulates learners' motivation to learn and engage with course content (e.g., Havice et al., 2010; Vagg et al., 2020) [31,36]. As shown in Figure 1, meaningful learning is influenced by the interactions between learner and instructor, learner and

content, and instructor and content. Interactive strategies, as used by the two instructors, provided examples of all three aspects.

6.2. Instructor–Content

Both instructors deliberately designed their courses to incorporate appropriate online pedagogical practices that allowed students to interact with the learning content. Technical facilitation strategies were particularly evident through instructor-created materials in the form of short videos/multimedia (Martin et al., 2018) [14]. As reported by Martin et al. (2018), instructor-made videos can help students understand instructional material, as was found to be the case in the Teaching Mathematics subject [14]. While the Chinese language instructor devised a component of the learning materials, she also made use of a range of digital resources, such as the writing skills resources and e-learning tools. The immersive Chinese Island provided opportunities for the instructor to interact with learners as they navigated their way through the virtual environment. Both cases demonstrate the importance of the instructor utilising appropriate interactive content to assist their students' learning. Such content may, but does not have to, be instructor-created to be effective.

6.3. Learner–Content

As Figure 1 showed, meaningful learning occurs when the learner engages with the content of a course. Multimedia-based e-learning environments encourage more learner–content interaction than do traditional learning settings (Zhang, 2005) [72], and this was evident in the use of the Chinese Island in the Chinese language subject. Students commented on the impact of the immersive environment in reinforcing previous learning and improving their vocabulary skills. These findings point to similar benefits relating to interactive visual stimuli identified by others (e.g., Di Paulo, et al., 2017; Havice, et al., 2010; Martin et al., 2018) [14,36,38], including increased student interaction with course content.

While the Chinese language students experienced a virtual target language environment, learners in the Teaching Mathematics subject were able to engage with the content through existential experiences, such as videos showing how games were played and how materials were used to teach mathematical concepts. In this way, the instructor provided her students with online activities that without technology, would require in-person participation.

6.4. Learner–Instructor

As the research indicates, instructor presence is the key to student engagement (e.g., Muir et al, 2019; Park & Choi, 2009) [23,24], and feedback from students in both case studies supports this finding. One of the most influential facilitation strategies in terms of instructors making connections and establishing relationships with students was through the use of video-based instructor introductions (Martin et al., 2018) [14]. This provides an example of how an interactive strategy, designed initially for instructor–content purposes, also helped to facilitate learner–content and learner–instructor engagement. Students in the Teaching Primary Mathematics subject in particular commented on how the videos helped them to comprehend the weekly work, and that they appreciated the relevance and currency of the videos. In addition, these learning materials helped to create a personal relationship between the learner and the instructor, as "it made you feel like you were having a conversation with her" (Kayla). This finding supports Jones et al.'s (2013) [73] research, which found that video-based instructor introductions helped form relationships with instructors. While the Chinese language instructor did not create introductory videos each week, she facilitated learner–instructor interaction through emails and one-on-one consultations with individual students. Overall, the findings indicated that, consistent with other research (e.g., Alla, et al., 2022; Martin et al., 2018; Roque-Hernández et al., 2021) [14–16], learner–instructor interaction was important for students, and perhaps particularly appreciated during the COVID-19 pandemic (Alla et al., 2022) [16]. The major forum for learner–instructor interaction in Teaching Primary Mathematics occurred through the use

of the subject discussion boards. As Shea and Bidjerano (2010) [45] (and Douglas et al, 2020) [48] found, a sense of an online presence from instructors is essential to enable positive learner–instructor participation, and the Teaching Primary Mathematics instructor maintained a consistent presence in the discussion board space, as evidenced by student feedback. The results show that the instructor provided a variety of strategies to encourage students to engage with, and discuss, the content through the discussion boards, which were generally regarded as valuable by the students. The comment by Marissa, however, is a reminder that discussion boards by their very nature may lead to a reluctance to post. Unlike the students and instructors in Thomas and Thorpe's (2019) [47] study, Marissa's feedback was not directed at the quality of the interactions or content, but rather the nature of the subject itself. The students in the Chinese language course were also able to interact with their lecturer through discussion boards, with their feedback highlighting concerns about the quality of the interaction (Thomas & Thorpe, 2019) [47]. This quality of interaction is essential in the success of discussion boards, particularly when online discussion is incorporated into the curriculum to mirror an authentic real-world activity (Gay & Betts, 2020) [74].

7. Conclusions and Implications

The case studies presented in this paper examined how meaningful learning is influenced by three types of interaction (Martin & Bolliger, 2018; Moore, 1993) [18,19], with a particular focus on the instructors' strategies to promote the learners' interaction with the content. The two case studies were selected as they showcase how it is possible to use interactive pedagogies to teach challenging course content. In addressing the first research question, the findings from this study indicate that instructors utilised a variety of interactive methods to promote the learners' interaction with the content, such as games, weekly challenges and puzzles, videos, discussion boards, and unit-specific digital tools. In response to the second research question, interview data provided empirical evidence towards the extent to which students perceived these online and pedagogical strategies to be beneficial to their learning. The results suggest that improvements in learner–content interaction, fostered by approaches such as providing personal support to students, being present to stimulate student engagement, and encouraging regular student communication opportunities, may help to enhance students' engagement. These findings have important implications for the design of online courses for university students. We acknowledge that the research is subject to a number of limitations with respect to its generalizability, based on the small sample size of interview participants and their self-selection. It is submitted, however, that the results nevertheless offer useful insights into pedagogical opportunities which facilitate online student engagement in their learning.

The insights gained from the findings may assist instructors in understanding learners' interaction with online content, as well as the impact of learner–content interaction on the learners' progress. Lin et al. (2017) [67] stated that learner–content interaction was the only factor that affected perceived progress. In addition, Kuo et al. (2013) [75] argued that student–content interaction was one of strongest predictors of student satisfaction with online courses. This study has demonstrated that meaningful learning can occur when attention is paid to all three areas of interaction, and instructors' use of interactive pedagogies can influence learners' propensity to engage with the content. This is supported by Alla et al. (2022) [16], who report that all three elements, and especially teacher presence, impact positively on the quality of online teaching in higher education. Teaching subjects that are inherently challenging calls for instructors to be creative, in terms of providing engaging course materials, and attentive in relation to regular communication with students and offering ongoing support and guidance. While, arguably, any instructor can select and provide appropriate content material, it is the role and presence of the instructor that is vital to engaging students with that content. For instructors that are new to online teaching, it is recommended that particular attention should be paid to establishing relationships which can be facilitated by regular learner–instructor interaction. Designing content that

is interactive and engaging, such as the examples detailed in this study, can also promote engagement, and provide opportunities for learner–instructor interaction. Considering the positive effect of learner–content and learner–instructor interactions on both student satisfaction and perceived progress, more research on content-related methods of engaging online students needs to be undertaken, to enable online educators to better facilitate online learning.

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