Does online engagement matter? The impact of interactive learning modules and synchronous class attendance on student achievement in an immersive delivery model

Elizabeth Goode, Johanna Elizabeth Nieuwoudt, Thomas Roche
Southern Cross University, Australia

One Australian public university is radically changing the way it delivers higher education, introducing a 6-week immersive scheduling delivery model across all units and courses. Despite the emerging success of block and immersive models for raising the performance of diverse student cohorts, the design factors underpinning positive outcomes are underexplored. This paper presents a mixed methods study of the impact and value of student engagement with interactive and responsive online content modules and synchronous classes in an immersive scheduling model. The findings indicate that behavioural engagement with online learning modules has a positive effect on academic success and is a significant predictor of a higher final score. Qualitative data indicate several attributes of high-quality online learning modules that students appear to associate with engagement and deeper learning in the immersive model: interactivity, media richness, constructive alignment, flexibility and responsiveness. Synchronous class attendance did not impact final scores; however, students nonetheless valued the opportunity to form safe and supportive communities of inquiry during classes. This study demonstrates that in times of increasing demand for more flexible learning, immersive scheduling models that are founded on active learning principles and embed interactive, responsive, media-rich online learning modules can improve student engagement and performance.

Implications for practice or policy:
- Higher education practitioners should integrate interactive, responsive, media-rich and constructively aligned online learning modules into curricula.
- Synchronous active learning classes that create safe communities of inquiry should be offered alongside options for asynchronous participation.
- Low levels of engagement with online learning modules should prompt follow-up from educators to raise engagement and bolster academic achievement.
- Immersive delivery models are effective curriculum innovations that, when designed with interactive online modules, can support improved academic achievement.

Keywords: immersive scheduling, online modules, active learning, student engagement, academic success, academic literacies, mixed methods

Introduction

The outbreak of COVID-19 forced universities across the globe to rapidly transition courses into fully online offerings. The higher education (HE) sector continues to be challenged by the pandemic, along with technological and social change, and environmental impacts from climate change; post-2020 HE is indeed "both a highly disrupted and evolving space" (Devlin & Samarawickrema, 2022, p. 22).

Implementing innovative delivery models founded on evidence-based pedagogical practice may be a key to the sustainable reformation of HE beyond the pandemic. The study of factors contributing to academic performance in online and hybrid learning is of enduring interest in the HE literature – and arguably even more so in post-pandemic times (Chung et al., 2022). While online learning must be carefully designed to avoid cognitive overload (Studente et al., 2019), the use of interactive online materials in unit designs that are hybrid or fully online can give students highly valued choice and control (Devlin & McKay, 2016; Nieuwoudt, 2020). Despite these benefits, access and achievement gaps between advantaged and disadvantaged learners have been exacerbated by the pandemic, as online learning modalities have become more prevalent than ever before (Mercer-Mapstone et al., 2022).

The question of how to offer flexible, accessible and engaging learning in ways that best support student achievement in lasting and sustainable ways therefore presents a critical opportunity and an unresolved challenge for educators and institutions. This paper explores an innovative immersive scheduling delivery model founded on active learning principles that can be flexibly and sustainably applied in hybrid and online modes. Effective and sustainable curriculum reform must be founded upon evidence-based principles that emerge from ongoing evaluation (Chung et al., 2022; Lodge, 2020). This research specifically evidences the impact and value of online learning modules and synchronous classes in immersive delivery, offering the sector a timely understanding of how immersive learning founded on active learning principles can improve student achievement and meet their needs for flexible and engaging education in post-pandemic HE.

Literature review

Immersive, active learning and student achievement

In immersive scheduling delivery models – variously known as "intensive", "block", "compressed", "accelerated" or "time-shortened" models – students typically complete one or two units at a time over as few as 2 and as many as 10 weeks (Davies, 2006). The shortened duration of immersive formats has led to concerns that students may not be able to achieve deep or long-lasting learning in these models due to a more limited time frame for reflection and practice (Budé et al., 2011; Dixon & O'Gorman, 2020; Lutes & Davies, 2018). However, cognitive load theory suggests that human cognitive processes are constrained by a finite capacity to engage in multiple tasks or tasks of high complexity and it follows that overloading this capacity can diminish cognitive performance and academic achievement (Mason et al., 2016; Sweller, 1988). Thus, other sources argue that immersive learning reduces the interference effects caused by competing cognitive demands, resulting in a more manageable cognitive load and an enhanced sense of focus (Goode et al., 2021; Richmond et al., 2015). This can better support students from a range of backgrounds to achieve academic success alongside other life commitments (McCluskey et al., 2019; Nieuwoudt & Stimpson, 2021; Zhang & Cetinich, 2022). Various empirical studies lend support to the notion that immersive learning does not compromise cognitive capacity or longer-term knowledge retention. Faught et al. (2016) studied health science students' knowledge retention at 3, 6 and 12 months after completing accelerated and traditional units and found little difference between outcomes for the two models. Additionally, a study of graduate outcomes in accounting found that alumni from an immersive program had similar success in a professional accreditation exam as their peers from a traditional-length program (Eames et al., 2018).

The extent to which immersive models can support authentic learning is a related area of concern, given that authentic learning is characterised by sustained engagement with complex tasks that reflect real-world contexts and practices (Herrington et al., 2014). Research at Victoria University in Australia provides insight in this regard; a core delivery principle of the university's 4-week block model is to set students "challenging authentic tasks" that encourage "complex decision-making, problem solving, and teamwork" (Victoria University, n.d.; see also McCluskey et al., 2019). The introduction of authentic learning activities using three-dimensional printed anatomical models was found to increase osteopathy students' engagement and confidence, while encouraging active approaches to learning (Tripodi et al., 2020). In science, technology, engineering and mathematics subjects, where exams were replaced with oral or laboratory assessments designed to reflect real-world practice, a marked decline in fail rates and an increase in average marks occurred after block model implementation (Jackson et al., 2022). Furthermore, a large-scale study of over 86,000 assessment results found that introducing the block model lifted marks in comparison to traditional offerings, with particularly pronounced effects for students from some Australian government–defined equity categories (Loton et al., 2022). Together, these findings provide indications that authentic and meaningful learning can occur in immersive delivery models.

Notwithstanding these positive findings, evidence also suggests that to facilitate such outcomes, immersive scheduling models should involve the careful implementation of active learning pedagogy (Ambler et al., 2021; Lee & Horsfall, 2010; Scott, 2003). Founded in constructivist learning theory, active learning requires students to participate and evaluate, rather than passively consume information (Biggs, 1999; Michael, 2006). Active learning emphasises that the construction of meaning is underpinned by students' actions during the learning process; such approaches therefore routinely eschew the traditional lecture and instead ask students to solve problems, ask questions, discuss, practice, create and reflect (Bonwell & Eison,

1991; Michael, 2006). Several large studies have found that active learning increases student marks and reduces fail rates (Freeman et al., 2014; Hake, 1998). Active learning has also been associated with enhanced engagement and motivation (Gordon et al., 2022) and the acquisition of lifelong skills that extend beyond the classroom and into students' professional and personal lives (Neo et al., 2012; Syme et al., 2021).

There is a variety of ways active learning pedagogy can be applied in online and hybrid environments, such as embedding interactive H5P activities in learning management system (LMS) sites and using teleconferencing for synchronous discussion and collaboration (Aziz & McKenzie, 2020). Evidence indicates that the introduction of online learning modules that guide students through interactive, media-rich materials can increase knowledge and skill acquisition as well as academic performance (Herbert et al., 2017; Moradi et al., 2018; Wong et al., 2020). Furthermore, synchronous classes drawing on active learning pedagogies have been found to enhance students' confidence and independence (Goode et al., 2021; Syme et al., 2021) as well as motivation, participation and performance (Rincon-Flores & Santos-Guevara, 2021; Tirado-Olivares et al., 2021). It follows then that an important approach to assessing the effectiveness of applying active learning principles is to explore students' engagement with core curriculum elements designed to promote active learning.

Student engagement and achievement in hybrid and online models

While student achievement in online learning is affected by a range of factors related to the student (e.g., motivation) and the learning environment (e.g., course design) (Chung et al., 2022), learner engagement is commonly acknowledged as a vital contributor to academic performance (Kahu et al., 2013; Kuh, 2009; Shelton et al., 2017). Engagement is a complex and multidimensional construct that can be difficult to define (Ashwin & McVitty, 2015; Fredricks et al., 2016; Zepke, 2018). However, it is widely accepted in educational research that engagement crosses three interrelated dimensions: behavioural, cognitive and affective (Fredricks et al., 2004) and thus can be defined as "the energy and effort that students employ within their learning community" across these dimensions (Bond et al., 2020, p. 3).

Behavioural engagement is an increasingly prominent focus of research concerning educational technology (Bedenlier et al., 2020) and includes indicators such as "participation, effort and time on task" (Hospel et al., 2016, p. 39). Analysing behavioural engagement is therefore important for exploring how student achievement can be enhanced through curriculum design. One way of measuring behavioural engagement is to examine how frequently students participate by accessing key learning experiences (Chung et al., 2022). In hybrid or online learning environments this access can occur through clicks on learning materials in an LMS or attendance at synchronous classes (Clark & Post, 2021). These actions have been recognised as proxies for engagement in hybrid and online learning environments (Dixson, 2015) and are also the focus of this investigation.

However, to what extent these forms of engagement matter and how to translate evidence into effective practice in hybrid and online learning is an area of ongoing investigation. Despite some evidence indicating that LMS activity does not affect or predict academic success (Broadbent, 2016), various studies have found that accessing online modules contributes positively to student learning and academic performance (Avcı & Ergün, 2022; Baragash & Al-Samarraie, 2018; Green et al., 2018). Meanwhile, some studies have found positive correlations between synchronous class attendance and student performance (Louis et al., 2016), while other research appears to support the notion that synchronous class attendance does not necessarily lead to higher academic performance (Chapin, 2018; Eisen et al., 2015; Nieuwoudt, 2020). Nieuwoudt (2020) found no significant difference between the final grades of students who attended synchronous classes and students who accessed class recordings, while Clark and Post (2021) concluded that students who independently access well-designed e-learning materials perform just as well as students who attend face-to-face classes. Overall, these findings strongly suggest that it is important to offer flexibility in how students can engage in learning. However, how to best design immersive scheduling curricula to heighten engagement and academic success remains underexplored and is therefore the focus of this study.

Research gap and questions

Immersive scheduling has been successfully implemented in HE institutions in the United Kingdom, Canada, and the United States of America; there are now two Australian universities moving all units and courses into immersive models (McKie, 2022). As noted previously, studies from these contexts indicate that immersive formats can enhance the academic performance of diverse student cohorts (see Austin & Gustafson, 2006; Loton et al., 2022; Turner et al., 2021) by reducing cognitive load (Richmond et al., 2015; Scott, 2003) and engaging students in active learning (Ambler et al., 2021; Lee & Horsfall, 2010; Scott, 2003). However, despite these generally positive findings, there is little research exploring how specific curriculum features drive achievement improvements in immersive learning. For example, Loton et al. noted that the data from their large-scale study on block learning did not allow for the identification of explanatory mechanisms underpinning heightened achievement. While there are some small studies indicating that the use of asynchronous online materials in immersive formats is valued by students (Klein et al., 2019; Kugler et al., 2019), overall it is difficult to identify from the literature which kinds of synchronous or asynchronous experiences may be particularly impactful. A more nuanced understanding of what may constitute good practice in immersive teaching delivery can be of great value to HE institutions and practitioners considering implementing immersive models to support heightened student performance and success.

Given this gap and the aforementioned importance of behavioural engagement in hybrid and online learning, this research sought to explore the following questions about student engagement and performance in an immersive delivery model:

(1) Is there a relationship between behavioural engagement in online learning modules and students' academic performance?
(2) Is there a relationship between behavioural engagement in synchronous classes and students' academic performance?
(3) To what extent does behavioural engagement with asynchronous online modules or synchronous classes predict students' final grades?
(4) What do students value about online learning modules and active learning classes?

Study context

This study is situated within a regional Australian public university with proportionally higher numbers of students from government-identified equity groups such as first-in-family to study at university and from low socio-economic status areas (Roche et al., 2022). Following deep reflection on how to address student achievement issues, the university is implementing a new immersive model across all disciplines and levels of study from 2021 to 2023. Known as the Southern Cross Model, it is proposed here as a pedagogical framework for raising student achievement and success through a combination of immersive scheduling, active learning pedagogy and the modular design of interactive online learning materials.

The model draws on cognitive load theory, as described above, by allowing students to focus on fewer assessments than traditional learning models. Departing from existing block models where students study one unit at a time over 4-week blocks (McCluskey et al., 2019), learning in this new immersive model takes place in 6-week terms with students able to take two units at a time (see Figure 1).
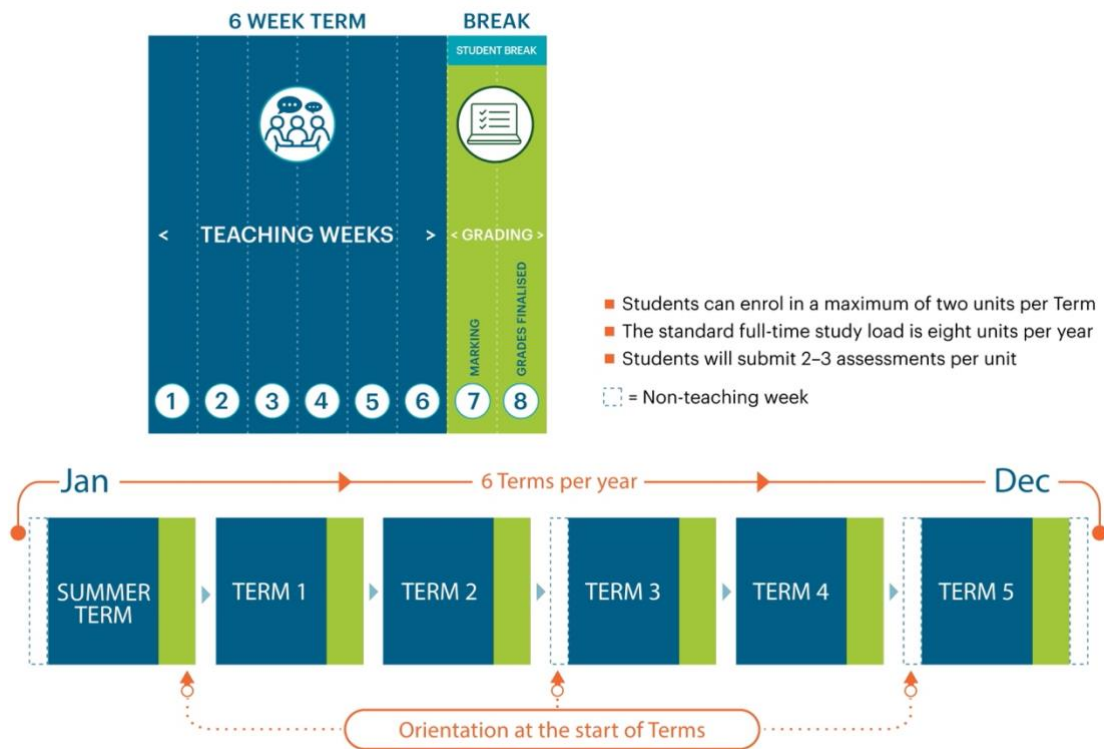
Figure 1. Teaching terms in the 6-week immersive model

To enable added flexibility and drive engagement, the model is designed for hybrid or online delivery and offers students two main forms of learning, summarised in Figure 2. All students, regardless of their mode of enrolment, are provided with self-access learning materials. These materials are organised into discrete learning packages (modules) that are designed to guide students through a scaffolded, media-rich curriculum while providing them with regular opportunities to gauge their learning through interactive and responsive activities. The activities include H5P content such as quizzes, interactive videos or slide shows as well as Mentimeter and Microsoft Forms polls. The modules are complemented by 3 hours of scheduled classes per week. These classes are guided, active experiences that take place online through Zoom or Blackboard Collaborate or through a mix of online and on-campus classes. The online classes are recorded and uploaded into the LMS sites for all students.
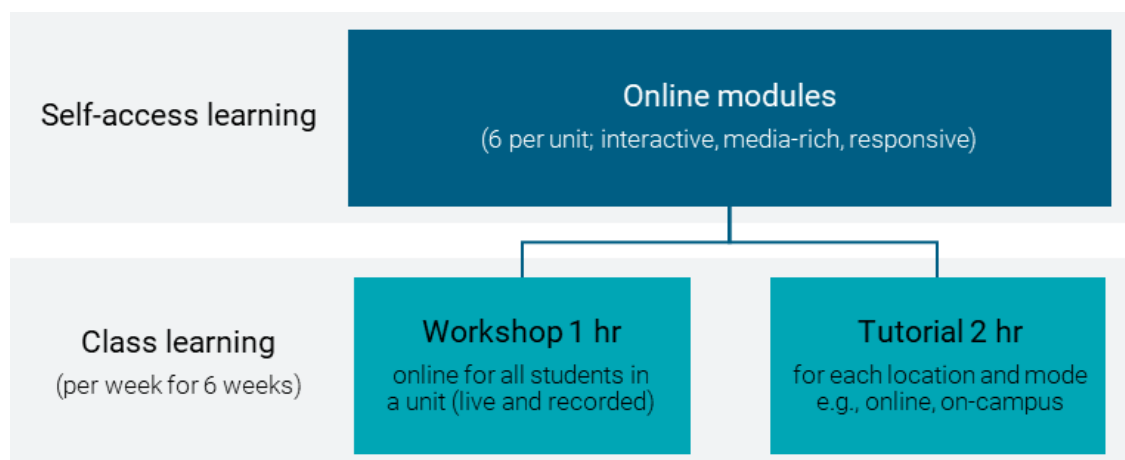

Figure 2. Forms of learning in the 6-week immersive model

The data explored in this study were obtained from two academic literacies units offered from 2021. The units A Culture of Dialogue and A Culture of Enquiry are foundational core units in the university's Bachelor of Business and Enterprise. While the units are embedded in the degree, they are also offered as

university-wide electives and taught by academic literacies specialists who teach into the university's successful pathways programmes (Syme et al., 2021). In 2021 A Culture of Dialogue was offered online and on-campus in Term 2 and online in Term 4. A Culture of Enquiry was offered online in Terms 3 and 5. Planned on-campus offerings in Terms 3, 4 and 5 were unable to proceed due to COVID-19 restrictions.

The aim of these first-year units is to develop academic practices in relation to and beyond the discipline's subject material (Macnaught et al., 2022). As the titles suggest, the units drew inspiration from the work of Bruner (1996) in *The Culture of Education* and their approach to developing the way students perceive and carry out academic discourse. The modules guide students through a series of real-world topics including climate change, the role of arts in society, Indigenous contexts and vaccination. While exploring the carefully curated, on-demand material on these topics, students are introduced to key academic literacies practices (Lea & Street, 2006) such as critical thinking, avoiding biases and using heuristics (A Culture of Enquiry), employing academic integrity and the conventions of academic writing (A Culture of Dialogue) and using digital and information literacy practices (both units) (Ahmed & Roche, 2021; Roche, 2017).

Tables 1 and 2 provide an overview of the unit learning outcomes (ULOs) and assessments in each unit. The units are each designed to achieve strong constructive alignment, whereby learning outcomes, assessment tasks and learning materials are purposefully aligned to support each other (Biggs, 2014). Authenticity was pursued by connecting academic literacies with real-world contexts and issues (for example, linking communication and collaboration with the discourse on immigration) and by designing assessment tasks that reflect common types of assessments students would encounter in the business degree (for example, preparing a report on a contested issue). The assessments were designed to scaffold students' development of key academic literacy practices by breaking complex tasks into more manageable sequences of smaller tasks. For example, the assessment scheme in A Culture of Dialogue engaged students in an online quiz covering academic integrity and information literacy, then guided them to articulate contrasting perspectives on an issue with support from credible academic references and finally tasked them with preparing a report on the issue. A Culture of Enquiry aimed to build students' collaboration competencies by guiding them to complete a critical review of a media article in small groups, before preparing an individual response to the article for the final assessment.

Table 1
Unit learning outcomes in A Culture of Dialogue *and* A Culture of Enquiry

A Culture of Dialogue	
ULO 1	Access, evaluate and disseminate information online
ULO 2	Use academic bibliographic conventions of citation and referencing
ULO 3	Communicate effectively and ethically in academic writing: Summarising, paraphrasing, quoting and using respectful academic language
ULO 4	Demonstrate understanding of the genre conventions of academic essays and reports
A Culture of Enquiry	
ULO 1	Identify how students know what they know; and identify frames, heuristics and biases.
ULO 2	Working in groups
ULO 3	Identify relevant sources for university study and demonstrate an understanding of text ownership and authorship
ULO 4	Interpret visually represented data

Note. This information was sourced from the university's internal unit and course management system.

Table 2
Assessment tasks in A Culture of Dialogue *and* A Culture of Enquiry

Type	ULOs	Weight	Length	Week due
A Culture of Dialogue				
Quiz	1, 2	10%	1 hour	2
Paragraph and evaluation task	1, 2, 3	40%	600 words	3
Report	1, 2, 3, 4	50%	1,200 words	6
A Culture of Enquiry				
Quiz	1	20%	1 hour	2
Critical review (group task)	1, 2, 3	30%	600 words	4
Short written response	1, 3, 4	50%	1,000 words	6

Note. This information was sourced from the university's internal unit and course management system.

The on-demand online modules and synchronous classes in each unit were designed to support the completion of the assessment tasks and the achievement of the ULOs. An example of a module activity in A Culture of Enquiry is shown in Figure 3: here, students are asked to watch a video on cultural communication differences and then complete the Cultural Differences questionnaire to inform further class discussion. These learning activities help students to develop effective communication skills for successful collaboration, which is then assessed in their group work task linked to ULO 2 (working in groups).

Figure 3. An example of a media-rich, interactive activity in an online module

Methodology

Study design

This research sought to examine the impact and value of online modules and synchronous classes on students' academic achievement (Ethics approval number 2021-025). The research employed a concurrent mixed design (Leech & Onwuegbuzie, 2009) involving the simultaneous collection of quantitative and qualitative data. The quantitative data are central to addressing the first three research questions. Complementarity was pursued by using qualitative data to elaborate on and deepen the understanding gained from the quantitative findings, addressing research question four (Bryman, 2006).

Sampling and data collection

Following Loton et al. (2022), the quantitative sample comprises observations, that is, instances of data associated with a unit enrolment. The data were collected from each unit's LMS site and included students' final scores and number of clicks in the modules. Attendance rolls were used to determine the percentage of classes attended by students in each unit. The data were de-identified after download for analysis. Demographic characteristics of the sample across both units ($N = 120$) are outlined in Table 3.

Table 3
Characteristics of the study sample

Characteristic		Count	Percentage
Age range	< 20	75	62.5%
	20–29	30	25.0%
	30–39	8	6.7%
	40–49	5	4.2%
	50–59	2	1.7%
Gender	Female	56	46.7%
	Male	64	53.3%
Language background	English	93	77.5%
	Not English	25	20.8%
	Unknown	2	1.7%
Resident status	Domestic	99	82.5%
	International	21	17.5%
Home socio-economic status	Low	17	14.2%
	Mid	68	56.7%
	High	12	10.0%
	NA (overseas)	21	17.5%
	Unknown	2	1.7%

Note. NA = not applicable.

The qualitative sample comprised students (n = 6) who had successfully completed one or both units between April 2021 and February 2022. A convenience sampling approach was utilised, with calls for participants issued via announcements and emails through the LMS. This resulted in one focus group and, as some students could not attend a common time, three interviews. All conversations were held online via Blackboard Collaborate or Zoom over 30–60–minute sessions. I (Elizabeth) facilitated and audio-recorded the sessions. Pseudonyms were assigned to anonymise the data.

Five of the qualitative participants were female and one was male. Their ages ranged from 18 to 48, with one student < 20, two students in their 20s, one in their 30s and two students in their 40s. Five students were in their first year of the Bachelor of Business and Enterprise and one was in their second year of the Bachelor of Psychological Science.

Data analysis

Descriptive statistics were used to explore the study population's characteristics. Inferential statistical tests were used to determine relationships between variables. Non-parametric tests were used, as variables were not normally distributed. The level of significance was set at $p \leq 0.05$. Spearman rank-order correlation analyses (r_s) were used to determine the relationship between academic success and two key variables: synchronous class attendance; and accessing the online modules. Kruskal-Wallis tests were undertaken to assess differences in final scores across three patterns of online module access. Three different patterns were recognised over a 6-week term:

- low level of access: ≤ 83.00 clicks
- medium level of access: 84.00–129.00 clicks
- high level of access: 130.00+ clicks.

Bonferroni corrections were made to control for possible Type I error for contrast analyses. Standard multiple regression analysis was conducted to determine how much variance of final scores can be explained by attendance of synchronous classes and accessing the online modules and to determine which is the best predictor of final score. Statistical analyses were performed using IBM SPSS Statistics version 28.

The qualitative data were transcribed and uploaded into NVivo version 12 for analysis. Drawing on Braun and Clarke's (2016) steps for thematic analysis, the first author read and re-read the transcripts, iteratively

coding excerpts into nodes and then into broader themes relating to students' perceptions of learning in the immersive model. The second and third author reviewed the analysis to achieve investigator triangulation.

Findings

Academic performance

The mean final score was 65.98 (*SD* = 19.56) out of a possible 100 for A Culture of Enquiry, and 62.79 (*SD* = 21.66) out of a possible 100 in A Culture of Dialogue (Table 4). Grades ranged from absent fail to high distinction. Absent fail grades were awarded to students as a result of not submitting any assessment tasks. Fail grades were awarded as a result of non-submission of one or more assessment tasks or an overall score of less than 50% for the unit.

Table 4
Students' final grades distribution

Final grade	A Culture of Enquiry		A Culture of Dialogue	
	n	**%**	***n***	**%**
Absent fail (0%)	2	3.6	1	1.5
Fail (0%–49%)	7	12.7	12	18.5
Pass (50%–64%)	5	9.1	14	21.5
Credit (65%–74%)	16	29.1	18	27.7
Distinction (75%–84%)	24	43.6	12	18.5
High distinction (85%–100%)	1	1.8	8	12.3

Relationships between academic performance and behavioural engagement in online learning modules and in synchronous classes

Spearman rank-order correlation analysis found significant correlations between academic performance (indicated by final scores) and students accessing the online modules. The median attendance of synchronous classes was 33% in A Culture of Dialogue, and 8% in A Culture of Enquiry. No significant correlation was found between final scores and synchronous class attendance, as presented in Table 5.

Table 5
Spearman rank-order correlation between final scores and students' online module access and synchronous class attendance

		Online module access	Synchronous class attendance
A Culture of Enquiry	Final score		
(*n* = 55)	r_s	**.468**	.206
	p	**< .001**	.131
A Culture of Dialogue	Final score		
(*n* = 65)	r_s	**.542**	.182
	p	**< .001**	.147

A Kruskal-Wallis test revealed a statistically significant difference in the final score across three patterns of online module access in A Culture of Enquiry (low level of access, *n* = 15, medium level of access, *n* = 20; high level of access, *n* = 20), $\chi^2(2, n = 55) = 9.799$, *p* = .007. The high level of access group (130.00+ clicks over 6 weeks) recorded a higher median final score (*Md* = 76.25) than the medium level of access group (84.00–129.00 clicks) which recorded a median final score of 71.25. The low level of access group (≤ 83.00 clicks) recorded a median final score of 68.00.

A Kruskal-Wallis test revealed a statistically significant difference in the final score across three patterns of access in the online modules in A Culture of Dialogue (low level of access, n = 26, medium level of access, n = 19; high level of access, n = 20), $\chi^2(2, n = 65) = 28.260$, p = < .001. The medium level of access group (84.00–129.00 clicks) recorded a higher median final score (Md = 75.00) than the high level of access group (130.00+ clicks) which recorded a median final score of 72.75. The low level of access group (≤ 83.00 clicks) recorded a median final score of 54.00.

Behavioural engagement with asynchronous online modules or synchronous classes as predictors of students' final grades

Standard multiple regression analyses were used to assess if online module access and attendance of synchronous classes predicted students' final scores; and to determine which the best predictor of final score is. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. The results of the regression indicated the two predictors explained 18.9% of the variance in A Culture of Enquiry (adjusted $R^2 = .189$, $F(2,52) = 7.292$, $p = .002$). It was found that online module access ($\beta = .466$, $p = .001$) makes the largest unique contribution, explaining 18.75% of the variance in final scores. Attendance of synchronous classes does not make a statistically significant contribution ($\beta = .006$, $p = .965$) to predict final scores.

In A Culture of Dialogue, the results of the regression indicated the two predictors explained 21.7% of the variance (adjusted $R^2 = .217$, $F(2,62) = 9.880$, $p = < .001$). Online module access ($\beta = .441$, $p = < .001$) makes the largest unique contribution, explaining 18.58% of the variance in final scores. Attendance of synchronous classes does not make a statistically significant contribution ($\beta = .143$, $p = .211$) to predict final scores.

Value derived from students' engagement with online learning modules and active learning classes

The qualitative analysis resulted in three themes related to students' perceptions of the modules: interactivity, relevance and flexibility. A fourth theme, community, highlights the value students derived from the classes.

Students repeatedly indicated their preference for interactive and media-rich materials where they were not merely asked to read text, but were instead provided with regular opportunities to interact with the material through quizzes or multimedia such as short videos. Lexie expressed: "I think it was kind of like a breath of fresh air because you're not just reading and reading and reading, you're kind of doing something different and engaging a different part of your brain".

The participants also emphasised that the interactivity heightened their enjoyment and deepened their understanding of unit concepts. Jackson's comment typifies this sentiment:

> I really enjoyed the modules for this unit. Just the little things where every so often, there's like a little activity where you got to try and match the word to the right context and just little things like that to really reinforce what you're learning.

Students also indicated that they valued the relevance of the online modules. As Amber noted, "it wasn't like … 'Why was that in there?' It was all very useful content". Students also appreciated clear links between the modules and class activities, which reinforced their learning:

> I enjoyed doing [the modules] as well, especially when we were going over and talking about them during the tutorials and seeing what everyone's ideas were about them. I think it all helped just learn more about what we were actually doing. (Lexie)

The third theme, flexibility, refers to students' appreciation of opportunities to review and practice material independently, while receiving feedback to gauge their learning. This built their confidence and deepened their understanding, as Gemma relayed: "[The module activities] felt like good practice … having that was a confidence booster too, that you can give things a go in your own time". Marie, who could not attend synchronous classes due to work commitments, reported that engaging with the modules helped her to structure and reinforce her learning: "I read through all the modules and did the activities, and I would do that prior to the Tuesday tutorial … I just need to do this and then I can do that". Lexie's comment reflects the overall sentiment among the participants that the ability to receive feedback supported deeper learning: "having all these different resources together as well as having that feedback, it helped piece all the bits together and help us gain a deeper understanding".

The final theme, community, indicates what students valued about the classes. All but one of the students in the qualitative sample attended synchronous classes either on-campus or online. They emphasised that they appreciated being in a safe classroom environment where they could find solidarity with other students and communicate openly about questions or confusions. Amber explained: "we were all definitely part of a community in on campus class and we all kind of bonded over everything. And the confusion we'd bond over, and when we finally understood we'd bond over that". Gemma, who attended online classes, emphasised that the open and friendly approach of the teacher was central to feeling comfortable enough to surface confusions and ask questions: "again I come back to the [teacher] making you feel comfortable … that I could be like, 'I have no idea what you're talking about' or 'I don't know'".

Overall, the qualitative data add to the quantitative findings by providing explanations for why students value the provision of online modules and synchronous, active classes. These reasons centre around interactivity, relevance, flexibility, responsiveness and community.

Discussion

The impact and value of online learning modules

This research demonstrates that accessing content in interactive and responsive online modules in an immersive delivery model has a statistically significant positive relationship with academic achievement and can predict higher final marks. Students who accessed interactive online modules more frequently in two immersive business units generally achieved higher final grades than their peers with a low level of access. Indeed, standard regression analyses indicate that accessing online modules makes a significant contribution to predict academic success. Accessing the online modules was measured quantitatively by the number of clicks in the modules, although the number of clicks does not indicate quality of engagement or learning. The quality of the learning activities in the modules are thus very important. Drawing on active learning pedagogy, these learning activities require students to engage with the content instead of passively consuming the information. Though measured by the number of clicks, students do not simply click through content or activities. Students are learning by actively engaging with the content, and this engagement is measured quantitatively by the number of clicks in the LMS. Dixson (2015) explains that clicking on material is "indicative of accessing the potential to be engaged" (p. 152), and can thus be considered a proxy or index of engagement. As noted above, engagement is, in turn, widely recognised as a critical factor underpinning student learning, achievement, success and retention (Tight, 2020). This research therefore supports earlier studies demonstrating the critical importance of student engagement with content in online and blended learning (Alqurashi, 2019) and in particular a relationship between students' engagement with online content and improved academic achievement (Nieuwoudt, 2020; Sugden et al., 2021). It also suggests that monitoring student engagement through clicks in online modules would be a reliable way of identifying those students who are at risk of failure and may benefit from further follow-up (see also Broadbent, 2020).

Through the qualitative data, this study also adds insight into the pedagogical factors that students consider important to the quality and impact of online learning modules. The current study indicates that students value online modules for their interactivity and media-richness (Covello, 2019; see also Devlin & McKay, 2016; Sugden et al., 2021) and that this leads to engagement and enjoyment. Evidence suggests that experiencing enjoyment while learning is linked to motivation and a sense of belonging, which is in turn associated with achievement and retention (Pedler et al., 2022). A potential connection between enjoyment and engagement with online learning modules (as indicated by the qualitative responses) and achievement (as evidenced by the quantitative findings) can also be inferred from the current research.

Student responses further indicate the importance of constructive alignment in the design of online learning modules. Students consistently linked the "usefulness" of the online modules to the achievement of their learning goals and indicated that the alignment between modules and classes deepened their understanding of concepts and skills they considered important and valuable. This builds upon earlier research concluding that constructive alignment is an important factor underpinning the learning and performance of pathways students in an immersive model (Goode et al., 2021) and that authentic and contextualised activities in online modules promote engagement and deep learning (Sugden et al., 2021).

Additionally, participants highlighted the value of responsive self-access materials. Flexible access to learning materials is increasingly important for widening participation in HE (Devlin & McKay, 2016; Nieuwoudt, 2020; Roddy et al., 2017; Stone et al., 2019). This study builds on this to suggest that self-access learning activities should be designed to be responsive, whereby students can independently gain feedback that helps them gauge their learning.

These findings also corroborate indications that students value and learn effectively from online learning materials that are interactive (Clark & Post, 2021) and that contain meaningful activities founded on active learning pedagogy (Sugden et al., 2021). The current study adds to existing research by emphasising that carefully curated materials that are not only interactive, but also media-rich, constructively aligned and responsive, are key to the engagement and enjoyment students derive from online learning modules.

The impact and value of synchronous class attendance

In contrast, this study does not suggest a significant relationship between synchronous class attendance and students' final marks. Furthermore, standard regression analyses indicate that synchronous class attendance does not make a statistically significant contribution to students' academic success. This supports studies indicating that attending synchronous classes may not be as important to academic success as previously thought (Chapin, 2018; Eisen et al., 2015; Nieuwoudt, 2020). In the current study, the majority of students did not attend the synchronous classes on a regular basis and it is expected that students watched the class recordings if they were unable to attend the synchronous class. Some research reinforces the academic value of watching recordings of synchronous classes in place of synchronous attendance. Nieuwoudt (2020) reported a significant association between watching recordings of synchronous classes and final grades and Chapin (2018) found no difference in final grades between different attendance rates of synchronous and recorded classes. This may explain why attending synchronous classes is not associated with students' academic success in the current study, and it is possible that watching the class recordings contributes to academic succes. However, watching class recordings was not captured by the LMS and could not be measured.

Nonetheless, the qualitative analysis indicates that students find value in attending synchronous classes. This value seemed generated through the curriculum's constructive alignment, with students appreciating explicit links between the modules and the classes, and on students experiencing a sense of safety and solidarity in a learning community. Research suggests that a sense of emotional safety is an important aspect of effective learning communities, also known as communities of inquiry (Akyol & Garrison, 2019), and is a factor that enhances academic achievement (Soares & Lopes, 2020). Emotional safety and a collegial atmosphere have been linked to facilitating the transitions and transformations of novice students entering HE (Habel et al., 2016; Lane & Sharp, 2014). Thus, while not statistically important for higher academic achievement, class attendance may nonetheless have broader benefits for students, helping them to experience more connected, supportive learning that can ultimately have positive implications for their achievement and persistence.

Limitations and further research

This research has a number of limitations. Engagement with the online modules was measured in terms of quantity (clicks on the material) rather than the quality of the engagement. Nonetheless, clicks can be a proxy for engagement and final grades may be indicative of deep learning (Nieuwoudt, 2018). Further research can explore the quality of the engagement by investigating time-on-task and seeking additional detail about the value of completing specific types of interactive activities, such as engaging with interactive activities, watching embedded videos and so on.

Another limitation is the absence of class recording views in the data. At the time of the study, at our institution, viewing Blackboard Collaborate recordings is not captured in LMS analytics reports. Given previous research indicating that watching class recordings independently can have a similarly significant impact on achievement as attending synchronous classes (Chapin, 2018; Nieuwoudt, 2020), further research is needed to more fully explore the value and impact of synchronous and recorded classes in immersive models.

This study concerns academic literacies (Lea & Street, 2006) units in an undergraduate business course. While we anticipate the findings of the study are likely to be found in other disciplines and courses, a broader study exploring the impact of student engagement as measured by interaction with online learning modules in other disciplines would provide academics across the academy with greater confidence in the relevance of the study to their areas of expertise.

Finally, the small study sample is a limitation that can be addressed by expanding this study across multiple units, disciplines and levels of study. Differences in engagement patterns and the predictors of success for different cohorts can then be explored. Although qualitative inquiry typically seeks richness rather than generalisability (Patton, 2002), the qualitative sample could also be expanded to include a broader range of students across multiple disciplines and backgrounds and to provide a fuller picture of the conditions supporting student engagement and achievement in an immersive model.

Recommendations for practice

These findings inform a number of recommendations for practice. The data indicate that the inclusion of carefully designed on-demand online learning modules is an important aspect of delivering flexible and engaging learning that enables academic success. The evidence indicates that these modules should be interactive, media-rich, responsive and constructively aligned to support positive learning outcomes.

The findings further suggest that students with a low level of engagement with online learning modules may be at risk of lower academic achievement. While the median score of students in the low level of engagement group was still above a pass in both units in this study, the scores were nonetheless consistently lower than students in the medium or high engagement groups and included some students who failed the units. Tracking engagement with online learning modules may therefore be a way to identify and initiate support for students at risk of failure, reinforcing the value of LMS analytics for prompting interventions that may improve retention in hybrid and online models (Broadbent, 2020; Shelton et al., 2017).

The findings also suggest that long or frequent classes may not be necessary for academic success in immersive models. In this new model, there are 3 hours of synchronous classes scheduled per week in each unit, which is a reduction in class time for some units compared to the traditional offering. However, the evidence presented here suggests that this may not impact student learning or achievement, provided that high-quality online learning modules and recorded classes are a core part of the curriculum. The impact of immersive scheduling on a wider range of disciplines is reported on in a related study elsewhere (Goode et al., 2022).

Thus, this research supports the importance of offering flexibility that enables students to engage with learning experiences synchronously or asynchronously. Some students do appear to benefit from live active learning classes that create a safe community of inquiry, despite the finding that synchronous class attendance does not affect final marks. Therefore, educators should provide students with a choice of high-quality synchronous and asynchronous experiences built on pedagogies that foreground active learning and communities of inquiry, as it appears to support student learning, engagement and achievement.

Conclusions

This research provides evidence of how an immersive scheduling approach underpinned by principles of guided, active learning contributes positively to student learning outcomes, thus making an important contribution in the area of student success and engagement. Within the context of a new 6-week model of teaching delivery, this research demonstrates that engagement with on-demand online learning modules has a positive effect on final marks, while synchronous class attendance does not affect final marks. Accessing the online modules is a significant predictor of higher final scores. Qualitative data indicate several attributes of high-quality online learning modules that students appear to associate with engagement, enjoyment and deeper learning: interactivity, media-richness, relevance through constructive alignment, flexibility and responsiveness. The qualitative analysis further suggests that students value the opportunity to safely surface uncertainties, ask questions and recognise points of solidarity with their peers during synchronous classes, whether face-to-face or online.

Overall, this study indicates that immersive delivery with interactive, responsive online modules and opportunities for synchronous, active class experiences that are also recorded can be an effective way of supporting academic success. This comes at a pivotal time in HE. At the time of writing, the university where this study was conducted was affected by the worst flooding ever recorded in the region and was forced to move to online learning again after two years of remote teaching under the pandemic. One of the key benefits of the model explored in this paper is that it provides all students with flexibility while allowing those enrolled in on-campus classes to be quickly transitioned to fully online learning when needed. In the highly disrupted and evolving higher education world of today, this study has shown how an immersive delivery model can provide an evidence-supported alternative to more traditional approaches to university teaching and learning, delivering lasting and sustainable benefits for learners, educators, institutions and ultimately the communities they serve.

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Corresponding author: Elizabeth Goode, Liz.Goode@scu.edu.au