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# Enhancing Online Instructional Approaches for Sustainable Business Education in the Current and Post-Pandemic Era: An Action Research Study of Student Engagement

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**Abstract:** The outbreak of the COVID-19 pandemic has pushed traditional classroom instruction to fully online teaching and learning modes. Higher education institutions in China were among the first to shift to these new modalities. The innovative integration of techno-pedagogies with the advancement of information communication technologies and multimedia applications made these rapid changes feasible in practice. However, the shift from traditional to fully online instruction was challenging. Student disengagement and learning performance losses due to these pedagogical changes have impacted the sustainability of educational programmes. We used mixed methods with dual-cycle action research to explore better pedagogical solutions. Seventy-six adult students, three teachers and three teaching assistants were involved in our study. Informed by the results of the first action research cycle, gamification was introduced in the second cycle. The gamified flipped classroom approach in the second action research cycle significantly improved student engagement, and their learning performance was sustained throughout the study. Suggestions for flexibility, all-in-inclusive, coopetitive learning, technical support and sustainable learning (F.A.C.T.S.) are proposed as a practical framework for new techno-pedagogical approaches in the current and post-COVID-19 era.

**Keywords:** techno-pedagogy; action research; adult education; flipped classroom; gamification; business education; post-COVID-19; virtual reality

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## 1. Introduction

During the outbreak of the COVID-19 pandemic, higher education institutions (HEIs) in China moved their learning and teaching activities fully online, which affected more than 30 million students at 3000 institutions in the main cities [1]. During the campus closures, HEIs transformed their traditional instructional modes into more flexible online modes using advancements in information communication technologies (ICTs) [2,3]. Nevertheless, HEIs have shown a lack of proper planning and experience in designing fully online instructions during disease outbreaks [4]. Therefore, the shift from traditional to online instruction caused student disengagement and learning loss in actual practice during the COVID-19 pandemic [5]. It is necessary to explore effective pedagogies in practice to sustain online educational programmes and mitigate the negative impact of campus closures. In particular, research is needed to help educators understand how to increase their students' engagement and sustain their learning performance in online learning environments.

Despite the vast improvements in ICTs and multimedia and social media platforms in recent years, HEIs still focused on traditional classroom lecturing approaches, with limited online instruction experience, before the onset of the pandemic [6]. Traditional classroom lecturing approaches are connected to a Chinese learning culture but result in low

levels of student engagement [7]. Under China's 'dynamic COVID-zero' and 'suspending classes without stopping learning' (SCWSL) policies, teachers were urged to organise flexible online instruction to sustain their HEIs' educational programmes [8]. However, adopting online education programmes in HEIs was challenging because of the teachers' limited experience, knowledge and skills in planning online instruction [9], which led to the reduced effectiveness of their online educational programme deliveries. Therefore, we need to understand the efficacy of existing online instruction of HEIs' educational programmes and how to improve in a fully online environment [10].

One of the flexible pedagogical approaches HEIs adopted before the COVID-19 pandemic was the flipped classroom approach. Students watched pre-recorded instructional videos online before attending their in-person class sessions [11]. The flipped classroom approach supposedly creates more in-class time for collaborative learning activities to boost student engagement [12]. Students watch the pre-recorded instructional videos online during the asynchronous self-study session before attending the synchronous class session [13]. Flipped classrooms enable flexible learning with self-study sessions and advanced learning with synchronous online class sessions [14]. Nonetheless, HEIs that adopted the flipped classroom approach in China experienced challenges, such as teachers' lack of professional training to record instructional videos with digital technologies [9].

Before going into details about the study, we provide an explanation of several terms involved in this study to facilitate readers' understanding. Sustainable learning refers to providing education with knowledge on how to maintain learning in different circumstances, including normalcy or crisis [15]. Techno-pedagogy is the combination of technology (e.g., ICT) with pedagogy, which enables effective teaching and delivery of course materials [16]. Gamification is using game elements in non-game contexts (e.g., education) [17]. Lastly, the gamified flipped classroom approach means the application of game elements (e.g., points and leaderboards) into the flipped classroom approach [18].

## 2. Materials and Methods

### *2.1. Research Design*

Our overarching goal was to understand the efficacy of current pedagogies in establishing a practical framework for designing new online techno-pedagogies in the present and post-COVID-19 era. The development of this framework will allow us to design new online pedagogies not only as a contingency plan but also as a practical guide to support student engagement and sustain their learning performance in online learning environments. We examined the challenges of the online pedagogical shift faced by teachers, teaching assistants and students during the pandemic using dual-cycle action research. The action research approach enhances our understanding of the required interventions and brings critical knowledge for practical improvements [19]. In addition, the action research approach avoids unfair treatment of students between the experiment groups [20]. Thus, the following research questions (RQs) guided our study:

RQ1. What is the efficacy of the current online pedagogy regarding student engagement and sustainable learning performance?

RQ2. How can we improve the efficacy of online instruction using the new techno-pedagogy regarding student engagement and sustainable learning performance?

RQ3. What is a practical framework for building new techno-pedagogies for the current and post-COVID-19 era?

#### 2.1.1. Class and Module Arrangements

In our study, we conducted two action research cycles among the spring cohort of the post-graduate business management programme at the Institute of Business, which began in May 2022. Three modules were taught from May to July 2022. Each module took one month to complete, including 16 h of synchronous online class sessions on two

consecutive days on weekends (i.e., 8 h each on Saturday and Sunday). Figure 1 shows the classroom arrangement of the first three modules in the spring cohort. Before starting the interventions in the first (June) and second (July) action research cycles, all students attended the first module (May) as usual in an online traditional lecturing format (i.e., online traditional classroom, OTC) (Figure 1). The topics of the three modules were Theme Park Marketing, Sales Analysis and Cloud-Based Marketing, respectively. All modules and teaching content were registered under the same qualification level in the qualification framework of education (i.e., Level 6) [21]. Therefore, all knowledge, content, intellectual skills and teaching processes were maintained consistently at the same level.

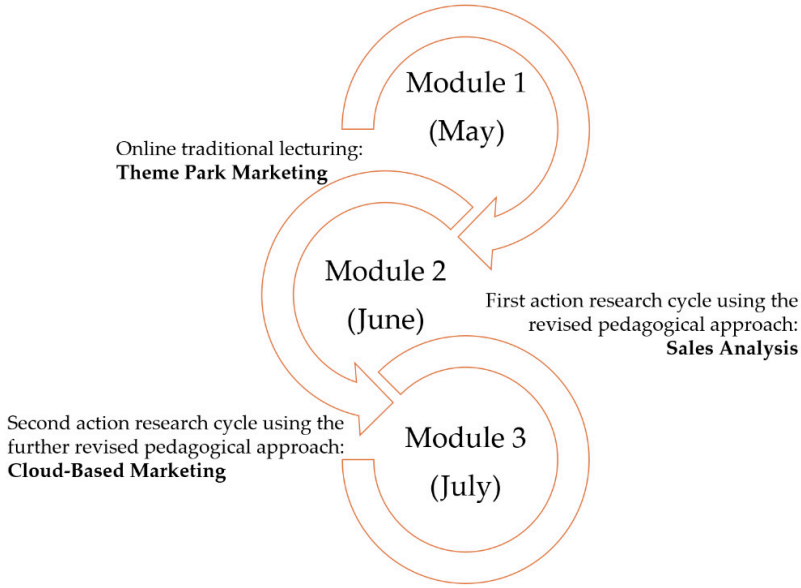



**Figure 1.** Class and module arrangements.

Each module included pre-class (Weeks 1–2), synchronous online class (Week 3) and post-online class (Week 4) sessions (Figure 2). In the pre-class session, the teachers encouraged the students to browse the online learning resources, including programme content, during their flexible free time [22]. The students then attended two days of synchronous online class sessions (Week 3) and finished an individual essay assignment (Week 4) to complete each module.

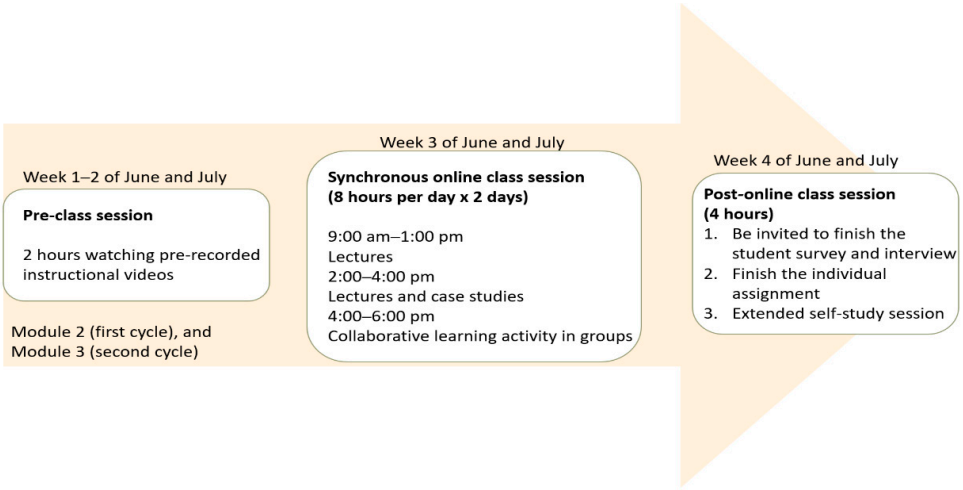



**Figure 2.** Rundown of class sessions for the two action research cycles.

2.1.2. Action Research Cycles and Interventions

This study aimed to assess current pedagogies and build a practical framework for improving the planning and implementation of new online techno-pedagogies, focusing on sustaining student engagement and learning performance. The learning gained through observations and reflections during the previous cycle guided our design for the pedagogy in the next cycle [23]. Four key stages comprised this cyclic research process (i.e., planning, action, observations, and reflections) (Figure 3). The first action research cycle started in module 2 (June) using the revised pedagogy after reviewing the problems and issues from the previous OTC practice. The second action research cycle was applied in module 3 (July) after evaluating the teaching review and reflection of the first cycle.

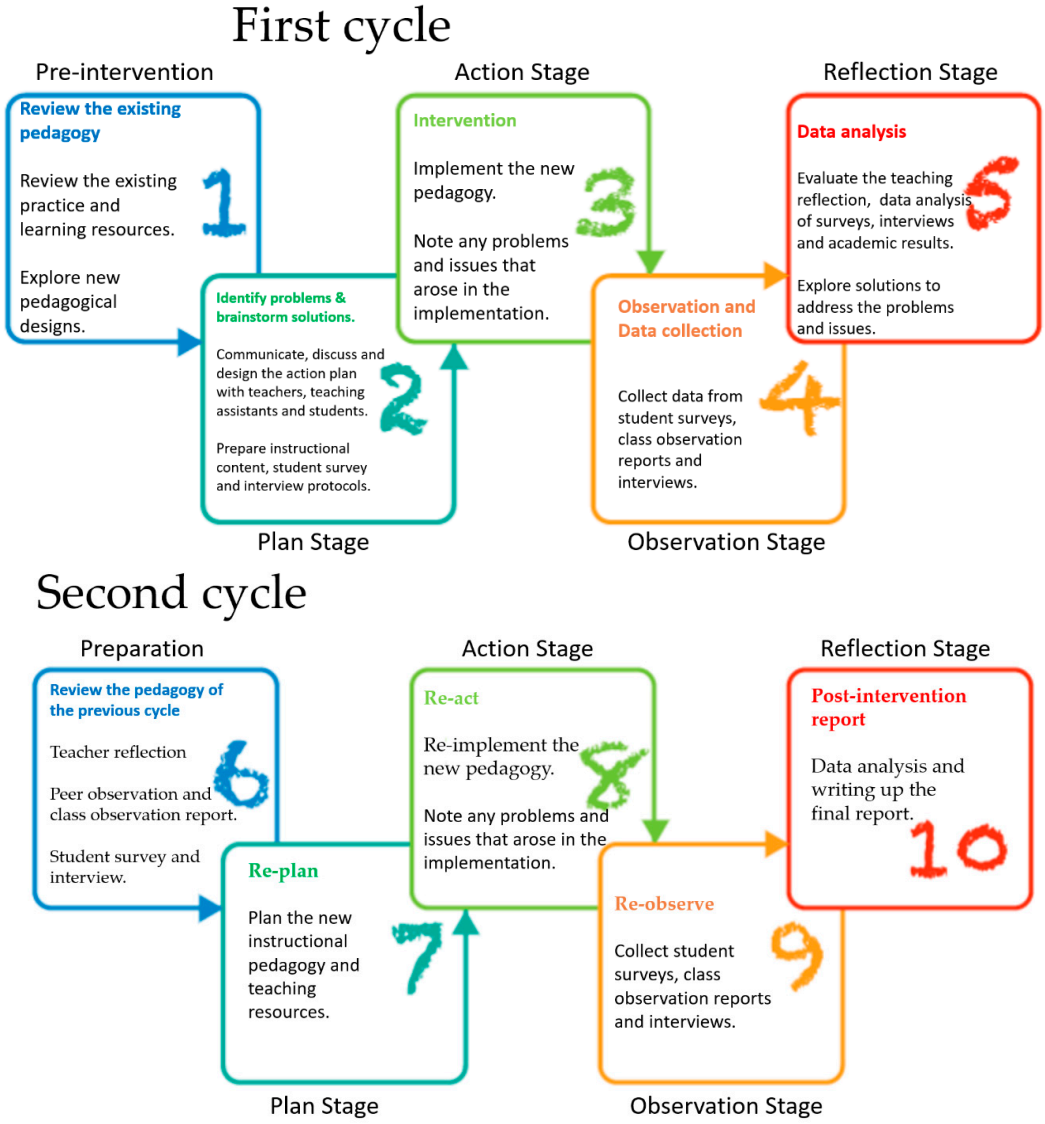



**Figure 3.** Overview of the two action research cycles and interventions.

*2.2. Participants*

Seventy-eight students (mean age = 35 years; 72% women) participated in the pre-intervention stage (i.e., OTC). However, two students withdrew from our post-graduate business management programme for personal reasons. Therefore, 76 students (mean age = 33 years; 74% women) participated in the first and second action research cycles. Three teachers and three teaching assistants participated in both action research cycles. Before the first action research cycle began, the teacher-researcher led and initiated the review of

teaching materials and collected feedback from students and teaching assistants with the other two teachers (Figure 3, Stages 1–2). The three teaching assistants were briefed on how to deliver the revised pedagogies before starting the action research cycles. The guidelines and instructions for the new pedagogies were given to all students in advance through the learning management system (LMS). The teachers and teaching assistants met online to reflect, exchange, and review their class observations from the first cycle (Figure 3, Stage 5). All actionable insights and items for improvement were included in the revision to the pedagogy for starting the second action research cycle (Figure 3, Stage 8).

### *2.3. Data Collection and Analysis*

This study adopted a mixed methods approach with quantitative and qualitative analyses. All data were collected after each synchronous online class session before the start of the next cycle. We analysed these data to propose a practical framework for devising new online techno-pedagogies during and after pandemics.

#### 2.3.1. Quantitative Data

The quantitative data sources included student surveys and learning performance results. We evaluated student engagement using a 20 min survey comprising 18 questions (Appendix A), with a 5-level Likert scale ranging from 5 'Strongly agree' to 4 'Agree', 3 'Neutral', 2 'Disagree' and 1 'Strongly disagree'. We included an open-ended question as the last item (i.e., Q18) to allow the students to share their thoughts and suggestions for improvement (Table 1).

**Table 1.** Sample items from the student survey questionnaire.

| Aspect | Sample Question | Supporting Citation |
|---|---|---|
| Perceived learning (Q1–3) | I learnt more because of the online class format (Q2) | [24] |
| Behavioural engagement (Q4–8) | I paid attention to my studies (Q7) | [25] |
| Emotional engagement (Q9–13) | I felt interested when we worked on something in class (Q10) | [26] |
| Cognitive engagement (items 14–17) | I made a lot of effort (Q15) | [27] |

Scores from the individual essay assignment served as quantitative data for the learning performance results. The academic committee assessed and approved the assignment questions, and the teachers strictly marked these assignments following the HEI's marking schemes and rubrics. An external academic examiner appointed by the institute reviewed 30% of the assignments and grades. Any discrepancies were resolved through discussion during regular academic committee meetings.

In answering RQ1 (i.e., the efficacy of the OTC pedagogy) and RQ2 (i.e., ways to improve the efficacy of online instruction using new techno-pedagogies), we analysed the quantitative data using Statistical Package Social Science software (version 28; IBM SPSS, Armonk, NY, USA). We used a *t*-test to evaluate and compare the students' engagement survey responses and checked the results with Cronbach's alpha reliability analyses [28]. We used the institute's annual monitoring report (AMR) as a benchmark for evaluating student learning performance results in the three modules because the AMR is a standard reference for student learning performance. Assignment scores with a B grade or higher indicate that students have demonstrated a good understanding and ability to use the knowledge and concepts they learnt during the lessons.

#### 2.3.2. Qualitative Data

The qualitative data sources included teacher and student interviews, class observation reports and teacher reflections. The interviews were guided by the semi-structured protocol focused on the challenges, problems, benefits and solutions for online pedagogies [11] (Table 2).

**Table 2.** Sample items from the semi-structured protocol for teacher and student interviews.

| Aspect | Sample Question |
| --- | --- |
| Challenge | • Compared with previous classes, what do you think of the new class approach, especially any challenges for your teaching/learning? |
| Problem | • Did you identify any questions and problems when attending the new class arrangement? Please illustrate your answer with some examples. |
| Benefit | • If the HEI reopens after the COVID-19 pandemic, do you think your teaching/learning approach will change? Please explain your answer using some examples.<br>• Do you think you will make any changes to your teaching/learning approaches using different technologies after the pandemic? If yes, please illustrate what they are and how to use them with some examples. |
| Solution | • How did you overcome the difficulties in your teaching/learning? Can you illustrate your strategy for overcoming these difficulties with some examples? |

The student's participation level in the learning activities reflected their engagement. According to Al-Zahrani [29], student participation levels can be ranged from the least engaged, passive receiving to students who perform active manipulation, constructive generation and the most engaged interactive dialoguing. The teaching assistants observed and recorded the students' levels of participation in their activity groups during the synchronous online class sessions by checking boxes in their class observation report forms (Figure 4).

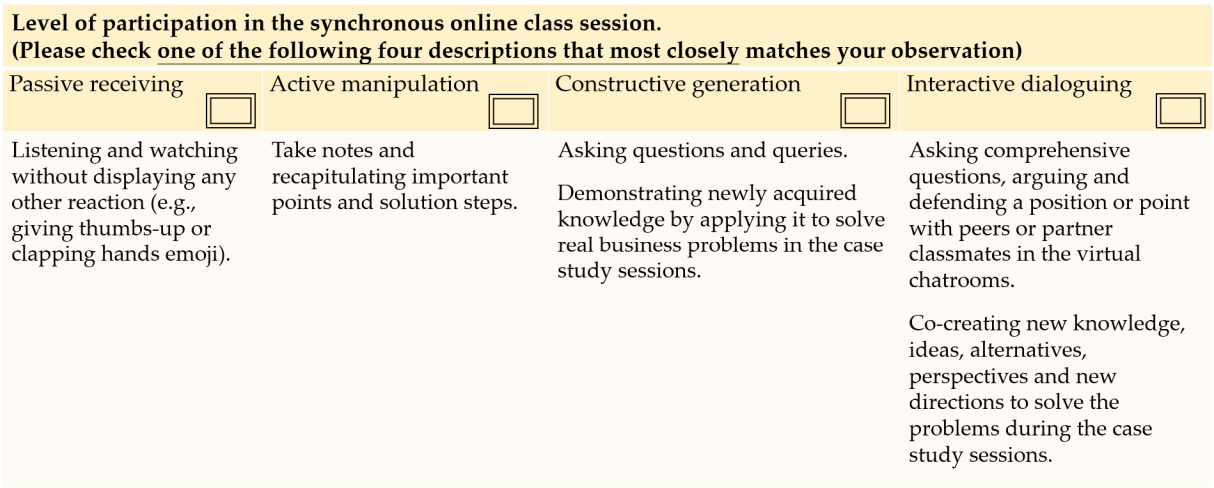



**Figure 4.** Class observation report forms for recording student participation levels during synchronous online class sessions.

2.3.3. Qualitative Content Analyses

To answer *RQ3* (i.e., a practical framework for building new techno-pedagogies), we conducted qualitative content analyses (QCAs) using the data obtained from the responses in teacher and student interviews, class observation reports and teacher reflections [30]. According to Kuckartz [30] and Saldaña [31], thematic categorisation and subcategories are crucial for effective QCAs because they are the building blocks of the theories that researchers will develop. Therefore, the data were first transcribed into Chinese, and we conducted QCAs accordingly by following the steps listed below [32,33]:

1. Concept-driven: We derived themes and subcategories from the literature on the current state of research and the RQs.
2. Data-driven: We completed a stage-by-stage procedure by opening and developing top- and sub-level codes until achieving saturation and continuously organising and systematising the formed codes at different levels with the new incoming data.

3. Mixed: We took these concept-driven themes and subcategories and subsequently coded all data accordingly with new generations of specific themes and subcategories when needed.

According to the findings, the teacher-researcher processed the data analysis and identified the core themes and new subcategories. The teachers examined the supporting evidence from class artefacts (e.g., student group presentations and virtual classroom posts) and recordings of online class sessions. The creation of themes, subcategories and data coding took place in cycles [32]. The RQs played a significant role in guiding and providing perspectives for text coding [33]. We coded the data from the second action research cycle using the corresponding themes and subcategories from the first cycle. We only created new themes and subcategories when necessary and with the coders' agreement (i.e., between the teachers). Two teachers collaborated on the transcription of the interviews in Chinese. Some data were translated into English for reporting purposes. Any divergent opinions regarding the themes and subcategories were resolved by the teacher-researcher and teachers who discussed these discrepancies to achieve consensus during the coding meetings.

## 3. Results

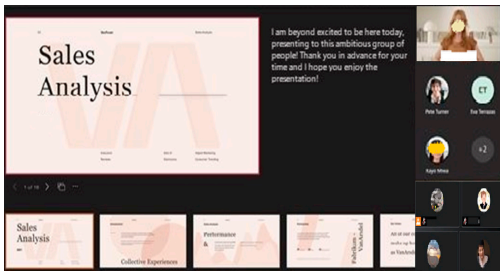
### *3.1. Overview of the Two Action Research Cycles*

Action research studies search for concrete, actionable items that can improve real-world practices [34]. Therefore, the teaching team (i.e., the teacher-researcher, two teachers and three teaching assistants) met online in the last week of each module (i.e., Week 4) for a dialogue-based discussion of the key findings and potential remedies for the next action research cycle. The key finding from the pre-intervention OTC module was that the students were disengaged, a common finding in traditional teacher-centric didactic online instruction with a lecturing style [35]. Following the literature [20] and an agreement between the teaching team, the online flipped classroom (OFC) approach was used as an actionable item for the first action research cycle.

Although the students were given a clear briefing about the benefit of online in-class collaborative learning activities before starting the OFC, they were reluctant to participate in the online in-class learning activities. This reluctance resulted in inadequate student interactions to achieve collaborative learning. We found that the students lacked learning motivation in the first action research cycle; therefore, the gamified flipped classroom (OGC) approach was used as the actionable item and remedy for the second action research cycle [36] (Table 3).

**Table 3.** Overview of the findings from the two action research cycles.

| Stage | First Action Research Cycle (OFC) | Second Action Research Cycle (OGC) |
| --- | --- | --- |
| Pre-class session | • A low number of students watched the pre-class instructional videos (27 out of 78 students, 35%)<br>• The teaching assistants suggested that teachers record a short briefing video to introduce the importance and significance of the instructional videos | • More students watched the pre-class instructional videos (61 out of 76 students, 80%)<br>• The pre-recorded videos did not replay smoothly online |
| Online class session | • Passive receiving without displaying reactions or giving feedback, low participation level and engagement<br>• Dull and silent class<br>• Most students' cameras were turned off; feeling alone and without belonging to the class<br>• The teacher-researcher suggested using game elements to motivate student engagement | • Asking questions and queries<br>• Improved participation levels in the collaborative learning activities<br>• More discussion and voicing out new thoughts and ideas<br>• Feeling supported and not studying alone (i.e., studying in groups with peers)<br>• Most students' cameras were turned on |

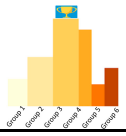
| | | |
|---|---|---|
| Post-online class session | • No connections with the institute or classmates until the next module<br>• No questions were asked before attending the synchronous online class sessions<br>• The teacher assistants asked to use a social media platform (e.g., WeChat) to improve communication with the students because they did not respond to LMS messages | • More active exchanges in the WeChat class groups after the online class sessions<br>• The teaching assistants received pre-class questions and enquiries from students<br>• A learning community and study groups were established for the students with the support of teaching assistants |
| Key challenges | • The students were inattentive and disengaged during the lessons<br>• The students were passive, and many did not participate in collaborative learning activities | • Collaboration and simultaneous competition between students during their learning activities observed |
| Screenshot examples of the online class sessions |  |  |

### *3.2. Implementation Improvement after the Two Action Research Cycles*

During the first and second action research cycles, 2 h of pre-recorded instructional videos (four 30 min videos) were provided online in the pre-class self-study session. We designed 2 h of in-class collaborative learning activities to improve student engagement during the synchronous online class sessions. We attempted to introduce gamification to motivate student learning after reviewing the feedback from the first cycle (OFC) and with reference to academic research. Gamification is a theory-driven innovative techno-pedagogy [37,38] with the potential to promote learning motivation and engagement in business management education when used together with the flipped classroom approach [39,40].

Hence, we used the OGC as the revised pedagogy in the second action research cycle. In the OGC, we applied game elements during the students' collaborative learning activities: namely, points and leaderboards with specific purposes. We used these game elements to further motivate student engagement and sustain their learning performance [36]. These points and leaderboards did not count towards students' academic results so distractions in their online learning could be avoided [41,42]. Table 4 presents the game elements and their applications.

**Table 4.** Application of game elements in the OGC.

| Game Element | Purpose | Award Criteria |
|---|---|---|
| Point  | Granular feedback to encourage participation in learning tasks and activities | Award to activity groups in the collaborative learning activity session, encouraging innovative ideas and solutions. One point is given to one innovative idea or solution. |
| Leaderboard  | Encourages intragroup collaborative learning and healthy intergroup competition between the activity groups when learners try to obtain more points for a prominent position on the leaderboard | All activity groups were ranked on the leaderboard based on the total number of points accumulated in each online class session. |

The institute's LMS did not support a gamification function. Therefore, we used Qitoupiao, a local online learning application (Figure 5). In addition, it has a unique gamification function that can be set in the leaderboard display to show each group's real-time accumulation of points. This function successfully increased the student groups' excitement and competitive learning behaviour [43].

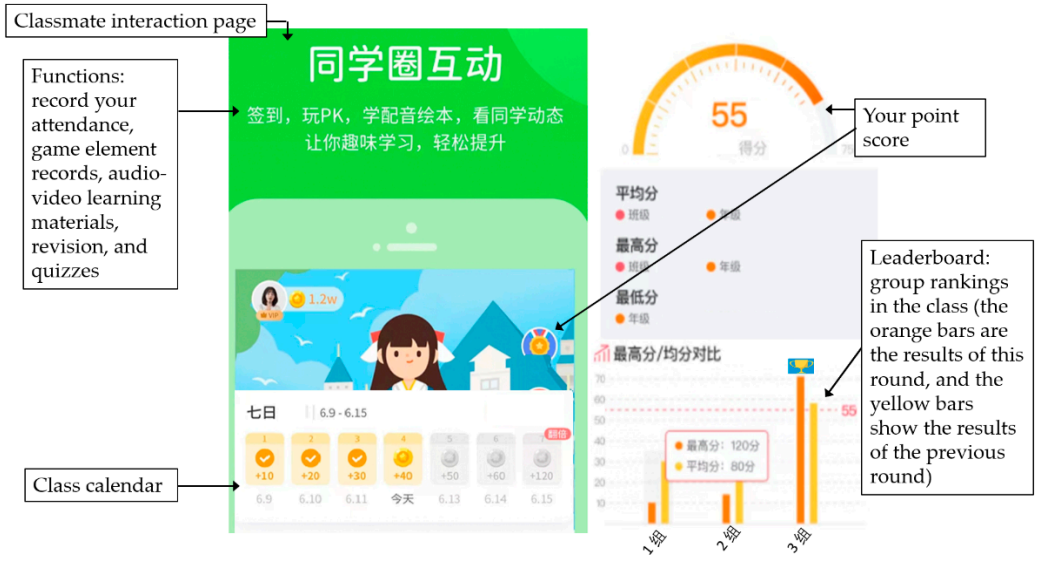



**Figure 5.** A screenshot of the Qitoupiao application.

### *3.3. Quantitative Results*

We analysed the students' survey responses from the two action research cycles (OFC, $n = 76$; OGC, $n = 76$). Cronbach's alpha for the OFC and OGC responses was 0.85 and 0.90, respectively, indicating the good reliability of the questionnaires [28]. Among the 17 survey items, there was a significant difference in 5 items (Table 5), indicating an improvement in student engagement in the second cycle (OGC).

**Table 5.** Student engagement survey questionnaire response of OFC and OGC.

| Survey Item | Survey Question | OFC Mean (SD) | OGC Mean (SD) | *t*-Value | *p*-Value |
|---|---|---|---|---|---|
| Perceived learning | Q2. I learnt more because of the classroom format | 3.53 (0.77) | 4.67 (0.53) | 10.63 | <0.001 |
| Behavioural engagement | Q7. I paid attention to my studies | 4.22 (0.51) | 4.47 (0.64) | 2.67 | <0.001 |
| Emotional engagement | Q9. I felt good when I studied | 3.89 (0.60) | 4.53 (0.64) | 6.36 | <0.005 |
| | Q10. I felt interested when we worked on something in class | 3.92 (0.54) | 4.54 (0.58) | 6.82 | <0.001 |
| Cognitive engagement | Q15. I made a lot of effort | 3.96 (0.53) | 4.50 (0.55) | 6.16 | <0.001 |

We used the institute's AMR to monitor student learning performance based on the benchmark for quality teaching and learning (i.e., ≥80% of the total student assignments with a B grade or above). As shown in Table 6, the percentages of assignment scores with B a grade or above for OTC (pre-intervention), OFC (the first cycle) and OGC (the second cycle) were all above 80%. That is, the student learning performance in the three modules was sustained without learning loss throughout the action research.

**Table 6.** Student learning performance in the two action research cycles.

| Class | *n* | Grade B or Higher (Merit) | Grade B or Lower (Pass) |
|---|---|---|---|
| OTC | 78 | 82.0% | 18.0% |
| OFC | 76 | 81.6% | 18.4% |
| OGC | 76 | 82.8% | 17.2% |

In summary, our quantitative data analyses showed that the OGC in the second cycle promoted the students' perceived learning and behavioural, emotional and cognitive engagement. Simultaneously, learning performance was sustained.

### *3.4. Qualitative Results*

The class observation reports showed that the students were primarily passive receivers in the pre-intervention (OTC) and the first cycle (OFC) modules. In contrast, the OGC module in the second cycle improved their participation levels from passive receiving to constructive generation. The teachers also noted that the students asked more questions and provided more innovative ideas during collaborative learning activity sessions. We also performed a frequency count of the themes in our qualitative analysis to obtain an overall picture of the participant's responses. These frequencies consolidated the insights from a total of 386 quotes from the two cycles that reflected the challenges, problems, benefits and solutions during the fully online instruction (Table 7).

**Table 7.** Themes and subcategories from our qualitative data analyses.

| Concept Theme | Subcategory | Response Sample | Key Component | Improvement Aspect |
|---|---|---|---|---|
| Flexibility (61 quotes, 17%) | Adapting to the switch between online and offline classrooms | 'The students could switch to online learning during the campus lockdown' (T-1)<br>'The flexible online and offline classroom arrangements were great and helpful for our class management' (TA-1)<br>'It was important to allow us to continue our studies, even during the pandemic lockdowns. We could have online resources to prepare ourselves while waiting to attend the online classes or campus classes when our campus was allowed to open' (S-13) | Online and offline learning | Technical network and online support |
| All-in-inclusive (104 quotes, 28%) | Inability to capture the students' attention and participation in the lessons for long hours of online class sessions | 'Unlike traditional classroom instruction, it was not possible to approach and observe the students on the learning platform, especially when they all turned off their cameras even after asking them to turn on' (T-1)<br>'The students would only start discussing topics when the teacher entered the virtual subgroup chatrooms' (TA-3)<br>'I saw one of my classmates still eating snacks while the teacher asked him to answer a question' (S-15) | Asynchronous self-study and synchronous online class session | Gamifying the classes |
| | Lacking interactions, exchanges and sharing experiences throughout the learning process | 'I very often received no responses when I asked questions during the online class sessions' (T-2)<br>'The online class sessions were very dull with a slow teaching pace because our teacher often asked questions and waited for answers' (S-15) | Real-time communication and fewer delays | Technical networks and online support |

| | | | | |
|---|---|---|---|---|
| | Difficulties in monitoring and managing the students' learning progress | 'I was unable to identify and track my student's understanding of the instructional content because seeing them on screen was different from face-to-face teaching' (T-3)<br>'I had to remind the students to submit their homework on time in the LMS repeatedly because I never received any of their replies' (TA-2)<br>'I might finish my homework and assignments on time if I knew how my classmates were progressing' (S-7) | LMS and social media platforms (e.g., Qitoupiao, WeChat) | Learning community and study groups |
| | Feeling lonely and helpless in their learning and studies | 'Help and assistance were not immediately available when I experienced problems, questions and uncertainties in my study' (S-17) | | |
| Competitive learning (86 quotes, 23%) | Learning from teachers and classmates (Collaborative learning) | 'As a teacher, I must organise more class activities, especially for online classes' (T-3)<br>'The students in online classes were not as active during exchanges as in traditional face-to-face classrooms' (TA-2)<br>'I was not interested in taking part in the class activities, especially for online classes, because it was not like being in a real classroom' (S-18) | Game elements (i.e., points and leaderboards) were used as granular and accumulated feedback to motivate students' learning interactions and collaborations | Gamification and motivation |
| | Pursuing better learning performance than other classmates in the class (Competitive learning) | 'The students worked hard in learning but were less willing to share their experiences in online class sessions' (T-1)<br>'The students always wanted to win against each other but were not always willing to share and help each other' (TA-2)<br>'I was afraid that my experience and knowledge were not as good as my classmates' own experiences and expertise (S-13) | Leaderboard rankings promoted healthy intragroup collaborative and intergroup competitive learning | Collaborative and competitive learning |
| Technical support (36 quotes, 10%) | The need for help and support in using distinct functions in the online instruction platform | 'It was the first time I had to instruct in front of a computer screen. I was struggling and felt helpless when I had problems using the online applications' (T-2) | Professional training for online instruction | Technical support and professional training |
| | | 'I provided pre-recorded instructional videos and put them on the LMS, but I felt that that the instructional contents should be presented differently online than in traditional classrooms' (T-3) | Smooth video streaming and live broadcasting | |
| | | 'I cannot get used to the technical stuff, such as how to reset hanging videos' (TA-1) | Desktop and mobile compatibility | |
| | | 'There were too many disconnections, and I needed to log in repeatedly, which was so distracting and annoying' (S-7 and S-12) | Network and connection | |
| | Difficulties in planning and integrating multimedia resources into online teaching practice | 'It was new to me to use multimedia and digital applications to teach the classes, especially in the online class sessions' (T-2 and T-3) | Technical support and training (i.e., skills and techniques in using technologies) | |

| | | | | |
|---|---|---|---|---|
| Sustainable learning (81 quotes, 22%) | Continue the educational progress during pandemic lockdowns and after synchronous online class sessions | 'The classes could still progress, although more slowly, which is better than completely halting all classes during city lockdowns' (T-1)<br>'If all the classes stopped for months, there would be great pressure to rearrange class timetables after reopening of the campus' (TA-3)<br>'I could continue my study during the home confinement and the uncertain period following campus lockdowns' (S-12) | Student connection and learning continuity | Establishment of a learning community and study groups |
| | The pedagogy should be sustained and welcomed by the participants | 'The most important consideration of online pedagogies should be how well the students like to use it to learn over the long time' (T-2)<br>'In-person interaction (further explained as personal presence) is very important for online class sessions because many students turned on their camera but were not listening' (TA-3)<br>'I did not have the in-person feeling of on-site presence as learning in the traditional classroom, after the lessons moved online' (S-7) | Creation of more immersive and participative learning spaces | Immersive VR applications |

Notes: T = Teachers, TA = Teaching assistants, S = Students, VR = Virtual reality.

Since gamification was the actionable item and remedy for the second cycle, the teacher-researcher revisited the students who did not appreciate the online class in the first cycle (i.e., OFC). Their response and feedback were as follows: 'We were more willing to turn on our cameras and worked on the group tasks assigned in the class exercise like playing team competitions' (S-15) and 'We don't want to lose and look down upon from other groups, so we work hard with the classmates in our own group' (S-13).

## 4. Discussion

We conducted our study in response to the call for new pedagogical possibilities to mitigate the potential impact of closures of HEI campuses on the sustainability of their educational programmes [1]. Our two main concerns were student disengagement and learning losses [5]. The two cycles of this action research study explored the challenges, problems, benefits, and solutions for innovative online pedagogies, with particular attention to student engagement and learning performance. We obtained significant insights from the two action research cycles involving three pedagogical approaches (i.e., OTC, OFC and OGC).

Based on the feedback and observations during each cycle, we added new ways of thinking and improvements to the next action research cycle; that is, OFC and OGC were added to the first and second cycles, respectively. Quay et al. [44] emphasised that 'the ways of doing are ways of knowing' (p. 110); thus, the results of our action research study disclosed the importance of flexibility, all-in-inclusive, coopetitive learning, technical support and sustainable learning (F.A.C.T.S.) framework in fully online learning environments. Coopetition is a noteworthy finding in our results. As noted by the teaching assistants, the gamification application displayed two rounds of group rankings in the leaderboard (i.e., Day 1 and Day 2) motivated more exchanges and discussion within the group. The teachers also reflected that the students gave more new ideas and solutions in the learning activities to earn more points in the OGC. Intra-group collaboration was promoted, and at the same time, students also exhibited the desire to win over other groups (inter-group competition). Muijs and Rumyantseva [43] also observed these co-opetition behaviours in educational settings; that is, students compete with their peers while learning collaboratively. Moreover, the results indicate the need for an immersive and

participative learning space which can provide in-person, on-site, interactive online learning experiences.

### 4.1. Efficacy of Current Online Pedagogical Approaches (RQ1)

Considering the first RQ, we found that moving traditional lectures online (i.e., OTC) was the most readily available approach to facilitate flexible learning during campus closures. However, as observed by Cao et al. [10], OTC provided a poor learning experience and caused student disengagement. Moreover, the teaching assistants reported that both the OTC and OFC modules led to dull classes, and almost all students turned their cameras off in online class sessions. In contrast to the proponents of OFC [29], our observation of flipped classes did not show any improvement in the student's participation level. Another recent study obtained similar findings [24]. Furthermore, our results showed that the students' inadequate learning motivation caused their disengagement in the first cycle (OFC), also noted by Lo [20]. As mentioned by Peters et al. [1], one of the reasons leading to student disengagement is that they are not naturally motivated by online pedagogies.

### 4.2. Efficacy Improvement of Online Pedagogical Approaches (RQ2)

We added game elements to the second cycle (OGC), and more exchanges and discussions were observed. In addition, more students turned on their cameras than in the earlier modules (Table 3). The game elements worked to support teachers' granular feedback (e.g., points) and promote coopetitive learning (e.g., leaderboards) [41], which both helped to motivate student engagement and increased their levels of participation in the learning activities [24]. During the OGC module, the students showed significant improvements in their perceived learning and behavioural, emotional and cognitive engagement. The study results showed that the efficacy of the online pedagogical approach regarding student engagement improved when using the OGC pedagogy. In addition, gamification promoted all-inclusive participation, including teachers (e.g., giving granular feedback as points to students), students (e.g., being motivated to provide more new ideas and solutions for teachers' points) and teaching assistants (e.g., running and displaying the gamification application). These supported the sustainability of educational programmes in online learning environments [41].

Following these significant improvements, technical problems also emerged (e.g., network or system issues, poor video broadcasts, weak online instruction skills and techniques). Asharaf [9] observed that shifting from traditional pedagogical approaches to online instruction is not as easy as we think because all sorts of technical problems may happen. The feedback from the teachers and teaching assistants in the two action research cycles also reflected the need for professional training among the teaching team to build their digital competence and online teaching skill sets [24].

### 4.3. Practical Framework for Online Pedagogical Approaches (RQ3)

Our study identified five themes and corresponding subcategories (Figure 6). The most mentioned theme was all-inclusive because the students were eager to express their thoughts and looked for the teachers' authoritative input, especially when they were motivated by game elements (i.e., points and leaderboards). The students also missed the on-site, in-person feeling of shared presence with their classmates and teacher, such as in the traditional classroom learning before the pandemic [45]. The second most quoted theme was coopetitive learning because the adult students were experienced practitioners and found it valuable to learn from each other, especially in the practical application of their acquired knowledge [24]. Simultaneously, these students regarded their class peers as competitors for academic results [41]. As observed by Muijs and Rumyantseva [43], the teachers and teaching assistants found that the students wanted to win over each other during the group discussion and presentations.

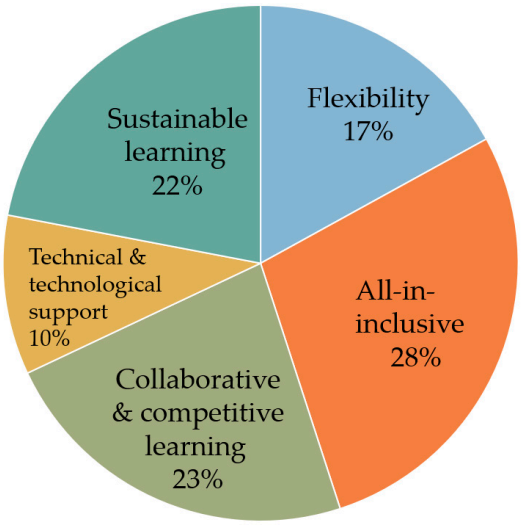



**Figure 6.** The five major quoted themes (F.A.C.T.S.) and their respective percentages.

The third most quoted theme was sustainable learning. The students wanted to continue their learning after each synchronous online class session. The students wanted to keep communicating and studying with their peers. Therefore, we set up a learning community and study groups using social media platforms [24]. Flexibility was the fourth most quoted theme. Students understandably benefit from online learning resources during prolonged campus closures because these resources allow them to self-study in their flexible personal time [44]. Finally, all participants (i.e., teachers, teaching assistants and students) mentioned the need for technical support. Online instruction would be impossible without using hardware and software applications. Teachers must prepare much more digital instruction and videos than traditional instruction. In addition, they must have the appropriate skill sets to manage different applications and media while teaching online. All participants were annoyed by the frequent interruptions due to issues such as network connections, delays and blackouts [45].

Following the emergence of new variants of COVID-19, HEIs must explore innovative and viable techno-pedagogies that can promote student engagement and sustain learning performance in online learning environments [45]. We propose a practical F.A.C.T.S. framework based on our study results to help HEIs develop new online techno-pedagogies. With reference to the F.A.C.T.S. framework and recent research [46,47], we plan to introduce more interactive, immersive and participative techno-pedagogies, such as incorporating VR in the next action research cycle (Figure 7).

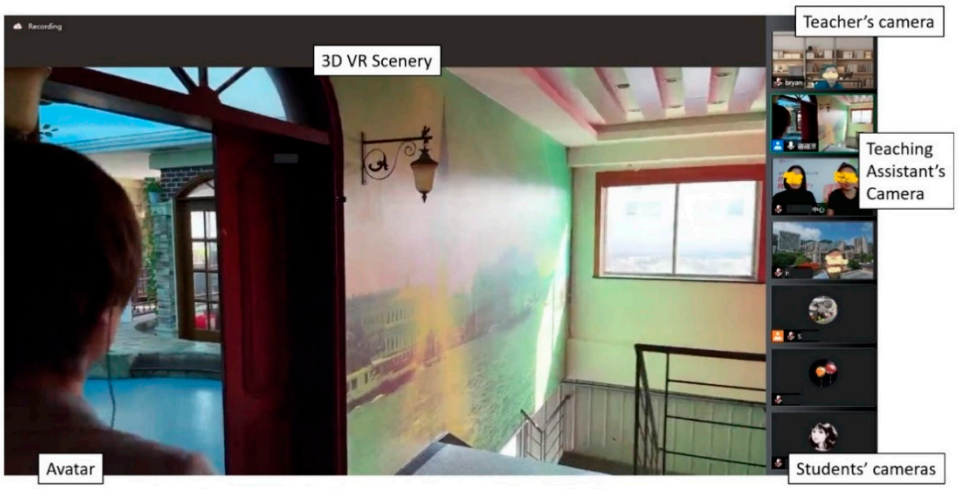



**Figure 7.** Online VR pedagogical approach using the F.A.C.T.S. framework.

## 5. Conclusions and Limitations

Various sectors of society were involved in fighting the outbreak of the COVID-19 pandemic, and educators were no exception [5]. Local HEIs commonly moved their traditional lectures online (i.e., OTC) and used flipped classrooms (i.e., OFC) [6]. Despite their various challenges and problems, we also observed various benefits and solutions for improving the efficacy of fully online pedagogies [7]. Our results showed that student engagement improved significantly in the second action research cycle by using the OGC pedagogical approach, and their learning performance could be sustained by fully online pedagogies during the COVID-19 pandemic.

This study contributes to exploring a practical framework (F.A.C.T.S.) to guide HEIs' development of the most appropriate online techno-pedagogies. However, this study was conducted with students from one discipline (i.e., business management) in one HEI in China. Therefore, our results might not be generalisable. Although they produced insights into improving the efficacy of online pedagogies, the student's perceptions of learning and engagement were subjective. Further studies with a larger sample are required to strengthen the scientific aspect. Furthermore, this study and the suggested F.A.C.T.S. framework focus on pedagogy and learning with an attempt to incorporate gamification Researchers can testify other options (e.g., personalisation and VR application) to increase student engagement [46]. Finally, HEIs must consider their funding and budget constraints in the development of engaging online techno-pedagogies [47].

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**Data Availability Statement:** The data samples and detailed coding procedures can be accessed by contacting the corresponding author.

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## Appendix A

**Table A1.** Student survey questionnaire.

| Aspect | | Questions |
|---|---|---|
| Perceived learning (Q1–3) | 1. | I found the programme to be a good learning experience. |
| | 2. | I learned more because of the classroom format. |
| | 3. | Classmates' comments were useful to me. |
| Behavioural engagement (Q4–8) | 4. | I tried hard to do well in my studies. |
| | 5. | In my studies, I worked as hard as I could. |
| | 6. | I participated in class activities and discussions. |
| | 7. | I paid attention to my studies. |
| | 8. | When I studied. I listened very carefully. |

| | |
|---|---|
| Emotional engagement (Q9–13) | 9. When I studied, I felt good.<br>10. When we worked on something in class, I felt interested.<br>11. The class was fun.<br>12. I enjoyed learning new things.<br>13. When we worked on something in class, I got involved. |
| Cognitive engagement (Q14–17) | 14. I was engaged with the topic at hand.<br>15. I put in a lot of effort.<br>16. I wish we could continue with the work for a while.<br>17. I was so involved that I forgot everything around me. |
| Open-ended question | 18. Would you like to add anything else (e.g., thoughts, suggestions) about your experience? |

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