English language learning in response to the COVID-19 pandemic: Hong Kong English as a Second Language students' perceptions of Badaboom!

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In the midst of COVID-19 pandemic, many university courses delivered in English are conducted entirely online. However, if we continue using traditional teaching strategies and the same set of teaching materials, it would be extremely difficult for students, regardless of age, to focus in a 2- or 3-h synchronous online class. As such, many researchers and educators are exploring different ways to engage students in today's digitally connected world. This article explores how English as a Second Language (ESL) undergraduate students come up with emergency remote learning at The Hong Kong Polytechnic University during the COVID-19 pandemic. Using exploratory research design, one hundred university students from five English for Academic Purpose (EAP) classes who experienced blended learning using Badaboom!, a Game-based Student Response System (GSRS), for one semester were recruited to participate in the research. 30 students were interviewed to collect the data. The interview aimed to detail their responses so their strategies can be mapped clearly. The data reveal that the tertiary-level learners of this study feel that game-based classroom response system is useful for assisting them in overcoming ESL academic writing difficulties. The study reflects that, most students favour the interactivity and engagement afforded by Badaboom! due to the strong instructor-student and student-student interaction as well as students' increased engagement.

Introduction

As mobile technology has become more widely used in today's classroom, educators are now able to enlist digital games to teach and learn. Classroom interaction used to take place using traditional student response systems (SRS), also known as "clickers" (Caldwell, 2007). Over the past few years, game mechanics have been integrated into traditional SRS resulting in Game-based Student Response System (GSRS). The use of GSRS is booming today, including Kahoot (Ulla et al., 2020; Kohnke and Moorhouse, 2021), Quizlet (Azman et al., 2018), Socrative (Kaya and Balta, 2016), and Mentimeter (Moorhouse and Kohnke, 2020). Multi-device interactions are possible through these interactive technologies, including laptops, smartphones, and tablets. Based on the design and processes of digital games, GSRS fosters an atmosphere of friendly competition in the classroom, thereby creating a pleasant classroom atmosphere. Gee (2005) claims that digital games are learning devices, and they can be an attractive addition to many classroom environments, allowing students to become even more motivated, engaged, and motivated to learn. Students can gain traction with GSRS by leveraging the many motivational factors such as leaderboards, leader badges, badges of achievement, reward points, and instant feedback loops, which encourage players to engage with educational content in a playful and dynamic manner.

The game-based classroom response system "Badaboom!" is modelled after the popular gamified quiz app Kahoot! and incorporates different gaming elements, such as rules, competitions, timing, rewards, and feedback through interactions with students. The introduction to Badaboom! in a blended classroom could be considered an innovation practice because it requires both teachers and students to be facilitators in a virtual classroom context. Furthermore, Badaboom! allows students to choose between more than four answer options before selecting the best one. Additionally, Badaboom! has an innovative option for numeric questions and answers and free handwriting, math, and symbol responses, which cannot be found in some other GSRSs like Kahoot, Socrative, and Mentimeter (see **Figure 1**). It is possible for students to respond by handwriting freely on their mobile phones, tablets, or laptops. In order for this to be possible, users can automatically transform their free handwriting into typed LaTeX by using automatic handwriting recognition technology. More importantly, the word clouds in Badaboom! system can show the words that are most frequent in free text and handwritten responses as well as the responses that are represented in LaTeX. Although Badaboom! was launched by the Hong Kong Polytechnic University in 2019, the application was mainly integrated in STEM subjects including

science, technology, engineering and mathematics. The use of this tool in the language classroom has yet to be fully explored as to how it can be beneficial to EAP students. Therefore, the purpose of this study was to examine how undergraduate students' perceptions of the incorporation of Badaboom!, a GSRS, into a blended EAP learning environment.

Paedagogical framework and paedagogical principles

Game-based learning

Learning today is characterised by the use of an array of instructional strategies, games and technologies, all of which are being used to cater the needs of diverse learners. As game-based learning technology continues to develop and become more mainstream, there are a number of positive ramifications for learning. Furthermore, it is equally important that the learners are motivated and engaged at a much higher level than before in order to change their behavioural and mindset patterns in a lasting manner. Hence, a major concern in formal education is to immerse students throughout the lessons. According to Ting et al. (2019), game-based learning uses game applications that have explicit learning goals to combine aspects of experiential learning with intrinsic motivation, allowing learners to engage in complex problem-solving tasks and activities that closely resemble real-world situations. Game-based learning has radically changed learners' preferences and learning abilities. This learning approach should be used to develop students' thinking skills, problem solving abilities, and independence.

Paedagogical framework for digital game-based learning

In this section, the paedagogical framework for digital game-based learning by applying Malone's Intrinsic Motivation Model (1981) will be examined. As Malone perceives it, learning is fun when players are challenged with problem-solving tasks in an environment where they are surrounded by audio-visual stimuli. He identifies three factors that significantly affect intrinsic motivation: the "challenge," the "fantasy," and the "curiosity" (see **Figure 2**). Goals with uncertain outcomes are thought to be the source of challenge. For instance, the level of difficulty can vary, multiple levels of goals can be set, there can be randomness and the feedback can be customised. Malone (1981) argues that self-esteem increases when players are not only challenged but are successful in overcoming the obstacle. Players who create fantasy environments in their competitive circumstances often imagine themselves in a way
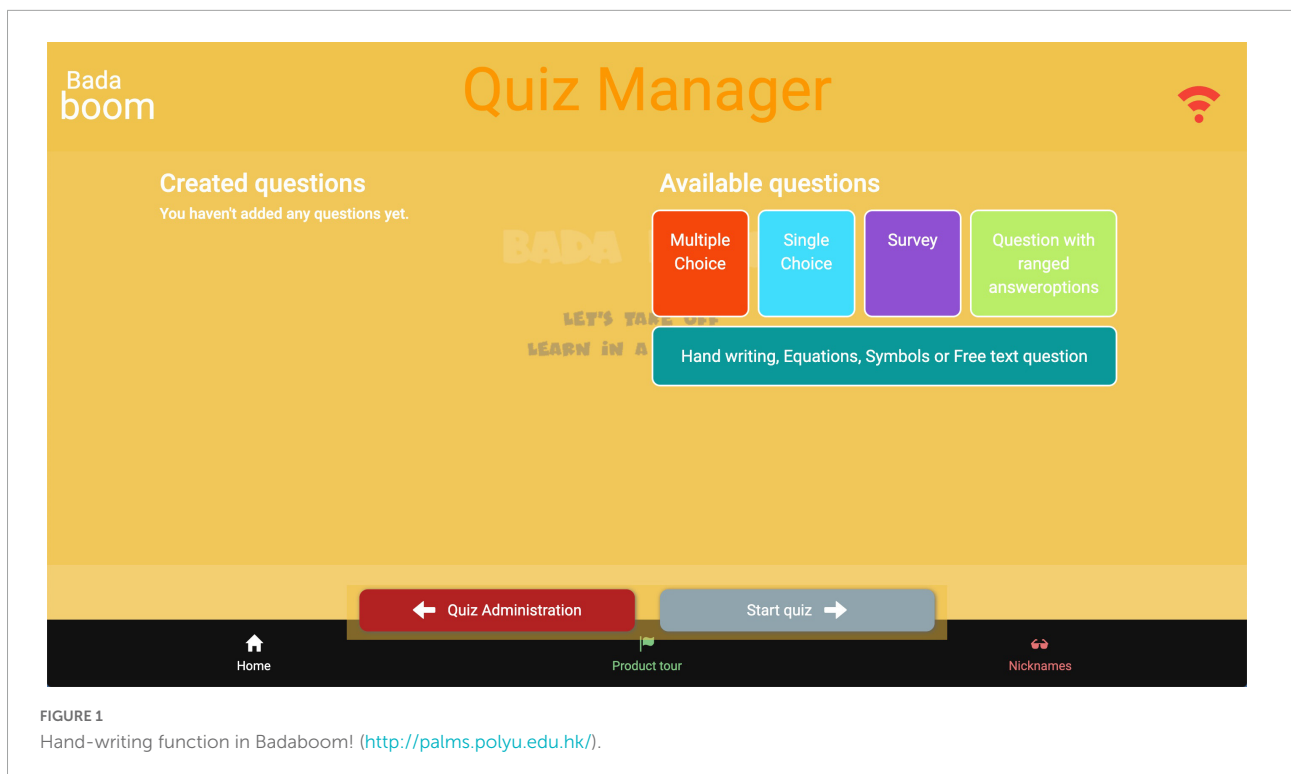
FIGURE 1

Hand-writing function in Badaboom! (http://palms.polyu.edu.hk/).
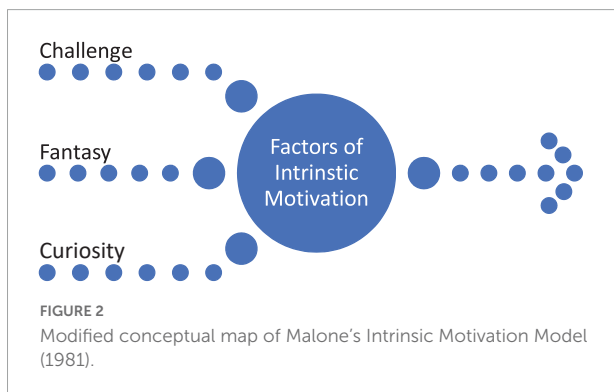

FIGURE 2

Modified conceptual map of Malone's Intrinsic Motivation Model (1981).

which is meaningful to them. Fantasy is a major pillar of digital games that often addresses the emotional needs of learners, thereby helping connect the new learning with their schematic knowledge. In contrast, the curiosity is the driving force behind the students' learning motivation (Ryan and Deci, 2000). The distinction between sensory and cognitive curiosity was made by Malone (1981). In GSRS, the auditory curiosity is heightened by the music, colours, audio effects, instant feedback, and interactivity as GSRS activates sensory curiosity, while cognitive curiosity is piqued by creating the illusion that learners' knowledge structures are incomplete and inconsistent. A GSRS, Badaboom! was created with the knowledge that these motivating factors would be taken into account when designed a gamified platform.

Sociocultural theory and zone of proximal development theory

Based on Vygotsky's (1978) notion, social contexts and learning are inextricably linked. The key to ensuring that one's strategies are effective in a social context must be able to identify and implement such strategies. Also, it is important to keep in mind that every individual has a unique culture, which is created by their unique strengths, language, and previous experiences. Collaboration with peers or mentors on projects involving real-life tasks and problem-solving skills is one way for students to gain knowledge. Vygotsky (1978) viewed not only social interaction as the most significant component of a child's mental development, but also social experiences as trough which children receive knowledge about the mediational means through which culture transforms basic cognitive traits into higher or more complex ones. Higher mental functions can be exhibited as a result of interaction with peers and mentors. Similarly, Piaget (1970) and Erickson (1977) emphasised that cooperative learning, added to experimentation, aides the process of learning. There is no doubt that peer interaction is crucial in speeding up and facilitating the learning process. The Zone of Proximal Development (ZPD) is a concept proposed by Vygotsky (1978) as a step toward cognitive development. It refers to working on a problem with peers who can offer guidance and encouragement. A challenge must be felt by the learners during the working process. As long as the difficulty level of the challenge is within the learners' Zone of Proximal

Development, then they should feel competent in the process. Since challenges and rapid feedback in digital games are related to progressive stages in Vygotsky's ZPD (Stott and Neustaedter, 2013), it is worthwhile to note that the dynamics of progression found in GSRS can help students enter the ZPD (Chaiklin, 2003). In the next sections, both teaching context and data collection will be explored.

The teaching context

This study was conducted at The Hong Kong Polytechnic University. This was done within the course "English for University Studies," a course that is required of all pre-university freshmen. These students came from diverse faculties such as Applied Science and Textiles, Business, Construction and Environment, Engineering, Health and Social Sciences, Humanities and Design. The course was offered entirely online for 3 h per week over a 13-week period during the COVID-19 pandemic. Besides improving students' English language proficiency within the context of a university study environment, this course aims to help students study effectively in the university's English medium learning environment. When this study was conducted, about 2,000 students were enrolled in 126 sections of this course.

Among the main learning outcomes of the course are (1) the ability to reference sources in written texts and oral presentations, (2) the ability to paraphrase and summarise materials from written and spoken sources; (3) the ability to plan, write and revise expository essays throughout the course using reference to sources; and (4) the ability to present effectively. The course was previously conducted entirely face-to-face, and students were required to write in-class problem-solution assessments using references to the assigned readings and to write an argumentative essay at home, as well as delivering academic presentations. Despite this, at the end of the semester, in a Student Feedback Questionnaire (SFQ) students expressed resentment at having been asked to complete both in-class assessments and homework assignments independently without adequate teacher input during the COVID-19 pandemic. Due to this phenomenon, the instructors of the course initiated a study of innovative methods to enhance the engagement of students through the use of technology, particularly in the case of emergency remote learning.

Methodology

Participants

Between September 2021 and December 2021, the study participants were recruited from full-time students in Year 1 at an EMI university in Hong Kong. An email invitation was sent to all students enrolled in the English for Academic Purposes (EAP) course, and approximately 85 students initially indicated interest in taking part in the study. There were a total of 30 participants who were deemed statistically significant (Kar and Ramalingam, 2013; Alwi, 2015) in the final analysis. It was not considered necessary to have taken similar EAP courses at other tertiary institutions in Hong Kong or their home countries before being shortlisted. Taking into consideration factors such as gender, place of origin and study field, I strive to ensure that the final selection of students is as diverse as possible. 20 Year 1 female students and 10 Year 1 male students from the School of Business, Engineering, Health and Social Sciences, Science, Design and Fashion and Textiles throughout the university were ultimately selected. Participants were guaranteed confidentiality and had the option of withdrawing from the study at any time.

Data collection and analysis

30 semi-structured interviews were conducted with students enrolled in the EAP course that were recorded and transcribed. The interviews ranged in length from 18 to 28 min. To elicit a wealth of information, the participants were interviewed in a non-threatening and comfortable environment in English, and I explored the ways in which they perceived Badaboom! to gain a clearer insight into their experiences and perceptions (Cohen et al., 2018). Audio recordings and transcriptions of the semi-structured interviews were undertaken. Two rounds of member checks confirmed the trustworthiness (Merriam and Tisdell, 2015). Every interview transcript was approved by all participants without changes.

I analysed the data manually using Braun and Clarke's (2006) six-step framework due to the relatively small number of participants. The six-step framework Braun and Clarke (2006) allowed me to analyse the data and create a detailed, rich, and complex account of the results. The six-phase framework includes (1) Familiarisation with the data, (2) Generation of initial codes, (3) Generation of themes, (4) Potential Themes Review, (5) Themes Definition and Naming and (6) Report Production. Some examples of items include: "I can feel the dynamics within the class once Badaboom! was used," "I think performing well in the game is so important."

Incorporating thematic approaches allows researchers to keep their flexibility while conveying their key ideas and perspectives. The second member check was completed by the participants, where they verified that the final results of the project and discussion accurately reflected their own experiences. The following questions were asked during the semi-structured interviews:

(Q1) How would you like to rate Badaboom!?

FIGURE 3
Thematic map of Badaboom! application in EAP class.
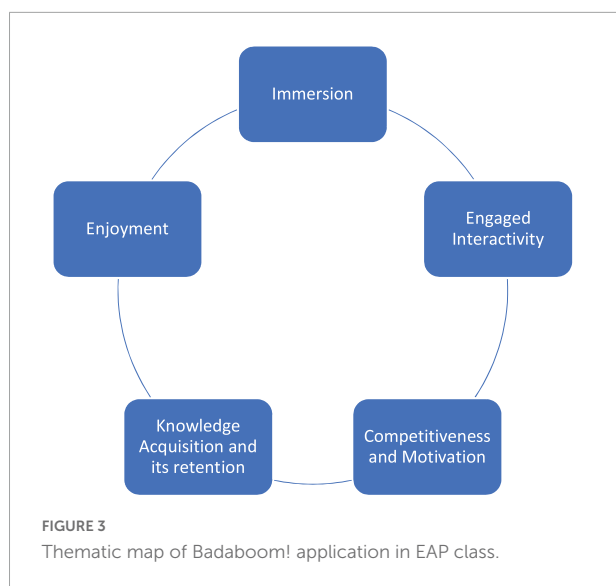
(Q2) When compared with traditional English class, do you think Badaboom! can help you understand more about the content, flow of idea, and style and tone of academic writing at the university level?

(Q3) Did anything make you engage with Badaboom! during the class time?

(Q4) Did anything make you not engage with Badaboom! during the class time?

Using thematic analysis, 30 responses were coded, resulting in five themes. A thematic map with all the responses is shown in **Figure 3**. According to the interview data, the 5 themes provided significant insights into how ESL students approach their learning experience when using Badaboom! during emergency distance learning sessions.

Results and discussion

Throughout this section, the research questions are addressed based on the findings, which examine the student participants' perspectives on Badaboom! regarding its benefits, processes and challenges in the integration of GSRS s into EAP classes. The five themes stated above were listed and organised based on the frequency of categorisation during the thematic analysis process.

Immersion

Based on the findings collected from the semi-structured interviews, almost all of them expressed a preference for Badaboom! integration in their first-year university EAP classes. They agreed that the integration of Badaboom! into EAP course

had advocated the immersion of EAR learning. The concept of immersion is a subjective evaluation of the degree of interaction and the degree of realism of the game (Dede, 2009). A player's sense of engrossment is measured by how much they are absorbed by or engrossed in an experience (Cheng et al., 2015). It is important to point out that game play offers players the opportunity to immerse themselves in a virtual world or a simulation of actual real-world interactions and experiences. Playing a game is an immersive experience consisting of various levels of difficulty or skill level. It is an indicator of the degree of interaction between the player and the game. Participants also said Badaboom! had aided them in recalling and memorising information, while others commented that Badaboom! quizzes, particularly before the submission of assignments, had greatly aided them in staying focussed and refreshed. As shown in these findings, social interaction stimulates cognitive functions in a way that is aligned with what Vygotsky and Cole (1978) believed about how ZPD supports learners' higher-order learning. As Susie reported,

> "I started to love my EAP class. Previously, my English was not good. I just feel that getting a fair pass is enough for me in this course as I am studying engineering. But after teacher used Badaboom! in the class, I feel that English course here is not as dull and boring as in my high school. I am now concentrating in my EAP course."

On top of the concentration, some other students voiced out how the sound effects impacted their concentration. A myriad of student participants appreciated the sound effects built in Badaboom! system which enhances students' learning experience.

> "The background music gives me a beat, boosting me to keep playing and working harder." (Janice)

> "Badaboom! is funny, charming and full of good vibes. I love the way quizzes are presented. You know in the old days, quizzes were presented on white papers and you may feel stressful and nervous when doing quizzes on paper. But now, with the use of Badaboom!, I can do quizzes in a stress-free environment with strong background music." (Mandy)

Another participant voiced out that Badaboom! was particularly useful in which it

> "brings me a vibrant and extraordinary learning experience since I want to immerse myself into achieving higher learning goal." (Jasper)

The above three comments raised by student participants reflect overall impression that through

participating in Badaboom!, participants' immersion can maximise their learning effectiveness. Samson, however, conveyed that he had felt distracted by the time pressure and the music, and he was adversely affected by the audio effects.

> "When the background music plays faster and faster, I was pushed to answer the questions as quick as possible when the time is up. I am very stressful."

Concentration was hampered by the length of the lesson along with the time of day the class was held. There are a number of comments that were made by students who said that Badaboom! relieved feelings of exhaustion and gave them a "refreshing break" from the 2-h session. In an interview with the student, Monica suggested that Badaboom! gave her a chance to "recharge" and "refocus" when she felt tired and sleepy in the morning.

> "You know it is very difficult to concentrate especially 8:30 a.m. classes on Monday. But after using Badaboom!, this could wake me up to join the class and avoid falling asleep."

Engaged interactivity

The results from semi-structured interviews showed that Badaboom! had increased students' opportunities for interacting with peers and assisted them in absorbing the class material to a deeper level. There was general agreement ($N = 30$) from the participants that Badaboom! had promoted active class participation, and made a positive impact on their collaboration skills.

> "I love team collaboration to answer questions." (John)

> "I didn't like English subject in my high school. But now I have more motive to learn, particularly how to present my idea in an argumentative essay." (Sam)

Gamification of classroom experiences, such as Badaboom!, has the potential to enhance an individual's motivational disposition with high-impact experiences that are immersive and flow-oriented. Participants' assertions confirmed previous findings showing that student engagement poses a significant challenge to EAP students (Jarvis, 2020). Therefore, a digital game-based learning experience helps EAP freshmen to foster acquire substantial EAP knowledge. Unsurprisingly, the

participants in the current study described Badaboom! as being vibrant and charming.

Data from the study also revealed an important aspect of participation: anonymity. It has been suggested that allowing students to use nicknames will lead to a wider participation in the study (Nielsen et al., 2013). Anonymity of participation is often seen as a weakness of GSRS (Nielsen et al., 2013). Students said during the interviews that they felt more comfortable using nicknames as they were afraid of answering the wrong way. In addition, students found the quiz activity to be both entertaining and exciting, while two others indicating that they use nicknames only when they are unprepared. These findings confirm those made in Freeman et al. (2006)'s research, which found that maintaining students' anonymity remains essential to fostering student engagement.

> "Sometimes, I will make a nasty nickname which would make everyone laugh out loud. But it's ok, just have some fun in the class." (George)

Interestingly, it was shown that some students expressed great interest in identifying themselves if they got high scores on the leaderboard, as this allowed them to recognise their accomplishments. According to Skadberg and Kimmel (2004)'s research, telepresence (players who feel connected to the action) has been shown to be a key element of a successful game experience.

> "I feel so proud if my name can come at the top of the list. This is an honour, just like the triumph for online games." (Zoe)

Competitiveness and motivation

In the semi-structured interviews, four student participants expressed that Badaboom! had motivated them to learn proactively. This finding seems to suggest that Badaboom! is intrinsically motivating since it brings the users total immersion and optimal gaming experience with an integration of various gaming elements such as goals, rules, timing and rewarding mechanism (i.e., earning points). The following comments describe the degree of competitiveness and motivation brought by Badaboom!.

> "I can see the value of Badaboom! because I can review how much I've learnt from the previous class." (Mark)

> "I want to get as high grade as possible in my written assessments. That's why I replayed Badaboom! game during

the spare time even though teacher is not beside me. I can learn how to distinguish between formal and informal words in academic writing." (Rose)

It was revealed that some students would attend English classes knowing that Badaboom! is used. This happened even more often when the English classes commenced at 8:30 a.m. Students said they concentrated more when competing against other students, while others said they studied before class to boost their chances of winning. This is in line with previous results that have demonstrated that GSRS has the ability to significantly enhance competitiveness and boost motivation (Nicolaidou, 2018; Wang and Tahir, 2020). It is also possible to explain this finding using Malone's (1981) intrinsically motivating instructions theory. A key component of sustained motivation, according to Malone (1981), is intense excitement motivated by competitiveness and control. As long as these needs are met, then perhaps interest is fostered in the lesson, leading to a higher level of engagement in the lesson as well as enhanced learning.

Knowledge acquisition and its retention

In terms of learning effectiveness, it was observed that Badaboom! contributed positively to students' knowledge acquisition. Also, it has been reported that Badaboom! helped quite a significant amount of student participants prepare for their written assignments since it is possible for students to measure their learning progress by how well they understand course content.

"Badaboom! works beautifully for me. Besides playing the game in class, I enjoy playing it individually during my spare time based on my schedule. In playing the game, I can keep track of my learning progress, review the key concepts we have learned in class, and reinforce our understanding of academic writing and communication to a broad audience particularly when the written assignment deadline is coming. Playing Badaboom! quizzes in class makes me feel like I'm in a real class. I can also get the explanation from teachers via Badaboom!." (Olivia)

"I can review those questions related to academic writing theory and academic vocabulary, so that I can apply them in my argumentative writing later on." (Sarah)

The above findings are congruent with those presented by Taylor and Reynolds (2018), and Wolff (2016) who

demonstrated that students in EFL contexts might benefit from GSRS to boost their vocabulary banks.

"Badaboom! helped me differentiate what is academic word and what are general words." (Tony)

Additionally, the students emphasised the importance of retaining information and identifying learning hurdles as two outcomes of the learning process. Badaboom! was rated as an excellent tool by numerous students for reinforcing their knowledge, or to identify their problematic area and rectify those errors.

"I can learn from other students if some answers are chosen wrongly." (Phoebe)

"I started to remember the formal academic words when I opted for the wrong choice on the Badaboom!." (Tony)

Badaboom!'s use of visuals, graphics and instant feedback appears to help students gain a deeper understanding of key concepts and characteristics of academic writing. In addition, students found the fact that they received feedback immediately very helpful in staying on top of their progress.

"I found it useful when the teacher discusses with us the wrong answers just after the display of the correct answer on Badaboom!." (Jessica)

Interestingly, when interviewed further about their thoughts on the effectiveness of Badaboom! in EAP courses, though, some of the interviewees expressed reservations including the following:

"This system can bring us lots of fun; however, I do have some doubts that how much we can learn from Badaboom! when compared with other learning tools such as videos." (Tony)

"I know learning should have some fun and I can see the value of Badaboom! in an EAP course, but the problem is Badaboom! still has its own drawback. For example, you can only learn something more if you try to do more follow-up work after class such as library search and consolidation exercises. So I would say persistence is very important. If not, then its educational value is questionable." (Sylvia)

Few students thought that Badaboom! did not help them improve their performance of process writing substantially. This finding is in agreement with Wang and Lieberoth's (2016) finding, who conclude that the use of

gamified platforms did not improve students' learning performance.

Enjoyment

Among all theme categories presented in Figure 3, enjoyment is the most prevalent motivating factor for Year 1 university freshmen students using Badaboom!. Based on the results gathered from semi-structured interviews, it was unanimously agreed that GSRS provides a positive classroom experience due to its element of fun. The Badaboom! quizzes were also perceived as rewarding by students, as they were deemed to be "satisfying." As a result of the Badaboom! experience, students felt that Badaboom! might reduce classroom boredom, making class time more enjoyable and eliminating distractions caused by mobile phones.

> *"Badaboom! gives me a beat when I feel bored in the EAP class."* (Simon)

> *"I love the way Badaboom! presents information. It does not only allow us to respond those open-ended questions, but Badaboom! can also allow images, add emoji, embed YouTube videos in the questions so that students can have more fun."* (Dorothy)

> *"I particularly like the Badaboom!'s virtual quiz lobby. Over there, both nicknames of incoming players and their average confidence level are displayed, so that it can make us more engaged and make the learning experience much more fruitful. It's just like the setup of the mobile phone games."* (Jeff)

In addition to its user-friendliness, students found Badaboom! to be a quick and easy-to-use application. One student even commented on how "quick" the application was. GSRS offered the students a chance to be recognised that might otherwise not have been possible in a traditional classroom setting. It appears that students preferred GSRS over traditional academic instruction. Several students expressed a feeling of joy, excitement and fun gained from playing Badaboom!, which led to a boost in self-confidence when they felt proud of their accomplishments. Interestingly and surprisingly, there were students who even mentioned that they liked sharing the progress they made on social media in order to make their parents and teachers proud of them.

> *"I am so proud of myself when I am always the top of the leaderboard."* (Sylvia)

> *"When I get the top five from the Badaboom! game, I captured the screenshots as to show off in front of my friends on IG. I hope that I can get as many likes in my IG post as possible."* (Marshall)

Conclusion

An examination of undergraduate students' perceptions of an integrated EAP learning environment incorporating Badaboom!, a GSRS, was the purpose of this study. It is suggested here that Badaboom! may be effective at retaining students' attention, increasing their engagement in the learning process, and motivating them to learn. Badaboom! was lauded by the study participants for its fun, engaging, and entertaining features. The competition mode made available by the system was well received by students, which indicates that it contributed significantly to their motivation. It is evident from these results that a GSRS has the potential to assist EAP students of different aptitude levels to succeed academically at English-medium universities. As compared with previous research (Barrio et al., 2016; Wang and Lieberoth, 2016), the results of the study suggest that Badaboom can be a valuable tool for students to enhance their knowledge and vocabulary. However, this does not necessarily entail enhancing students' assessment grades.

Limitation and recommendation

The benefits of Badaboom! are clear for language teachers; however, this study may suffer from limitations that could potentially compromise its validity and generalisability. The primary limitation lies in the nature and functionality of Badaboom!. In an EAP course, students may find it more difficult to practice writing if only GSRS is used. Therefore, teachers should consider involving students in some post-lesson online writing tasks *via* some prominent tools such as Google Docs, OneLook, Bubbl.us, MindMup and Hemingway Editor as a means to help them practice and consolidate academic writing strategies even though many face-to-face lessons are suspended during the COVID-19 pandemic. The second limitation is that Badaboom! is also susceptible to loss of novelty if used excessively (Wang and Tahir, 2020). The final limitation is that the data collected from the semi-structured interviews are completely self-reported by student participants with no assessment records to measure their achievement. Due to this, it is still difficult to conclude that Badaboom! can lead to improved learning performance without further evidence,

since the perception may differ from the real achievement of the learning outcomes.

As far as the recommendation is concerned, it is suggested that strategic integration should be utilised to improve both receptive and productive language abilities. Ideally, Badaboom! integration should occur three to four times per semester. Research in the future may involve tracking students' assessment grades and attendance records in order to corroborate the findings of this study.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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