Gamification in Virtual Learning in Tertiary Classrooms

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***Abstract*—This research investigates the effectiveness and impacts of gamification in virtual learning in tertiary classrooms in Hong Kong. The study focuses on the transformation of physical and psychological behaviours of teachers in English across curriculum and university students towards game-based learning and their adaptability; the ease of applicability and popularity of various gaming tools in relation to both the educators and learners' technological literacy and training received, as well as equipment support offered by educational institutions. The paper also explores the possibility and limitations of gamification in virtual classrooms. This accelerates future course development with corresponding changes towards course redesign and assessment restructuring with a switch to a new form of digital learning experience as the trend. The study thus provides a framework to the application of gamification in other language subjects and contexts in classroom learning across the globe, with reference to the motivational force and interactive learning.**

***Index Terms*—Gamification, virtual learning, motivation, effectiveness.**

I. Introduction

The use of games has become a popular trend within adults and youngsters across the globe. Academics, scholars, educators, and practitioners have been discussing the incorporation of gamification in classroom learning, which is referred as an educational term or even pedagogy used in learning with games to improve students' English Language competence since it reflects an innovative and captivating learning activity in the 21st century [1]. This research investigates the tertiary educators' and learners' adaptability, perception and attitudes towards gamification in both online classrooms and face-to-face classrooms in Hong Kong, during and before the pandemic. This study also examines the impacts, practicality, success and limitations of game-based learning in motivating and engaging students towards sustainable learning in both remote and traditional classrooms in tertiary education.

II. Methodology

Two sets of questionnaires were administrated and distributed to university and college teachers and students in Hong Kong in various English Language courses at different levels. Among all the student respondents, a vast majority (90.7%) are undergraduates from different disciplines and specializations taking English Language subjects across curriculum among different universities in Hong Kong during the pandemic era. More than half of them (63.2%) are currently studying in bachelor degree programmes in The Hong Kong University of Science and Technology, followed by undergraduates from The Hong Kong Polytechnic University (23.7%), City University of Hong Kong (5.3%) and King's College of London (1.3%). A vast minority belong to the group of college students (5.2%) in higher education prior to their admission to universities in Hong Kong, who are studying in associate degree and higher diploma programmes in HKU SPACE Community College (2.6%), HKU SPACE Po Leung Kuk-Stanley Ho Community College (1.3%) and HKCT Institute of Higher Education (1.3%). Among them, 37.7% of them are studying in undergraduate year 2, followed by 27.5% of them coming from undergraduate year 1 and 26.1% from undergraduate year 3. Less than 9% are studying in associate degree year 1 to year 2 and higher diploma year 1 to year 3.

Undoubtedly, gender is a considerable factor in determining the competence and interest towards game using in classrooms apart from the learners' educational backgrounds and the level of competence in English Language acquisition. Considering this variable, respondents are asked to indicate their gender in the questionnaires and surveys. Interestingly, a majority of them are males (72.4%) while a minority of them are females (26.3%). In addition, 90.7% belong to the student group whereas 9.3% are English Language educators in universities and colleges in Hong Kong. Other than gender variants, further data analysis later reflect how demographic is another determinator to govern the learners' competence of digital technology, practicability of gamification and thus the effectiveness and success of gamification in both virtual and face-to-face classrooms, which influences the degree of interactive learning environment and student-teacher relationship.

III. Results and Findings

The research juxtaposes the transformation of physical and psychological behaviours of educators and educators towards various game-based platforms in online classrooms from the first semester shortly after the outbreak of the pandemic until the following academic years and face-to-face classrooms before the pandemic in Hong Kong, with a view to the effectiveness of learning, student engagement, motivation and incentive, motivation and effectiveness; and limitations and suggestions. It is concluded that most university teachers and students have got used to use Zoom in remote learning and find it at ease of exploring other teaching and learning platforms as a result of the pandemic.

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Game-based learning is an interactive learning methodology and instructional design strategy that integrates educational content and gaming elements, by delivering interactive, game-like formats of instruction to learners [2]. Moreover, such learning integrates aspects of experiential learning and intrinsic motivation with game applications that have explicit learning goals, thereby allowing learners to engage in complex, problem-solving tasks and activities that mirror real-world, authentic situations [2]. With simulation and physical artifacts, physical classrooms could be simulated during the pandemic period.

A. University Learners' Perceptions and Attitudes towards Gamification

Among the student respondents, a vast majority (87%) of university and college students indicate positive perception towards the effectiveness of learning in classrooms through gamification. On the other hand, only 1.4% disagree learning through games is effective. More than one-tenth (11.6%) totally agree that learning through games is effective while more than half of them (55.1%) strongly agree such teaching strategy is effective. More than one-third (31.9%) believe that it is somehow effective (Fig. 1). In the view of the perception of effectiveness of gamification towards classroom learning from students' perspective, a majority (73.9%) reckon incorporating games is a constructive means to learn. 15.9% regard this approach as the most effective, followed by 58% perceive gamification is very effective in tertiary education while 18.8% are neutral. 5.8% claim that gamification is an ineffective pedagogy in helping to learn better while 1.4% regard it as the least effective way (Fig. 2).

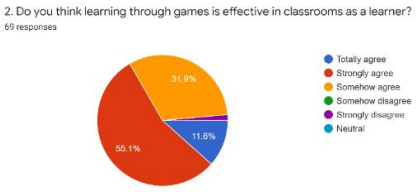

Fig. 1. Perception of university student respondents towards effectiveness of gamification in classrooms.

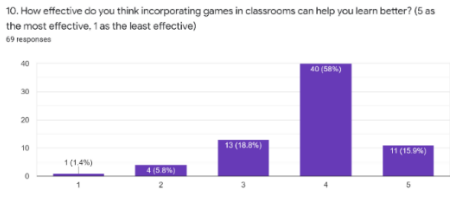

Fig. 2. Extent of effectiveness of gamification towards learning from the perspective of university students.

In correspondence with the measurement of the effectiveness of learning in virtual classrooms, students' perception in being motivated to learn through games is a considerable factor contributing to the conclusion whether the learning experience is effective or not. 94.2% of student respondents reveal that learning through games is a significant incentive to motivate them to participate fully in classrooms. On the contrary, 2.9% disagree incorporating games in classrooms is effective in motivating them to learn better while another proportion of 2.9% are neutral towards gamification in classrooms. Regarding the level of effectiveness of gamification in motivating them to learn better, a vast majority of the student respondents (76.8%) hold the view that learning through games in university classrooms is the most effective (15.9%) and very effective (60.9%) respectively as a motivational drive to learn better. 15.9% are neutral whereas 7.2% reckon it as not effective (5.8%) or the least effective (1.4%) pedagogy in motivating learners (Fig. 3).

Fig. 3. Extent of motivational drive through gamification from the perspective of university students.

More than a half (53.8%) believe the major reason is that learning through games in classrooms is fun, followed by 26.2% regard visuals and colours are more appealing than plain words which come as the second most important concern. Interestingly, more than one-tenth of student respondents (10.8%) explain that they want to win their fellow classmates which demonstrates peer influence is a vital factor in governing the level of class participation. Less than one-tenth (7.7%) feel that gamification can encourage them to accomplish all the given tasks through teamwork, which in return motivates them to learn with peers. 1.5% believe that playing games online has been the trend and therefore it is expected to be a norm to incorporate games in their learning experience (Fig. 4).

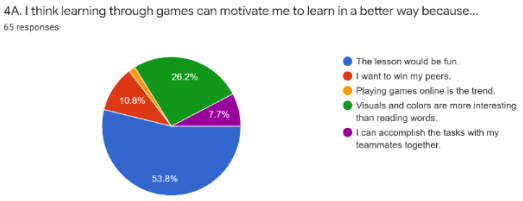

Fig. 4. Reasons explains why gamification can motivate students to learn better.

Meanwhile, just 5 student respondents disagree that learning through games can motivate them to learn better. Among respondents who show a negative correlation between gamification and motivation, 40% reckon this can be justified by the common perception that learning is always dull and boring. One-fifth (20%) indicate that even games are incorporated in classrooms, they are incomparable to the fun of video games that they are playing in pastime. Similarity, one-fifth (20%) believe that learning in classrooms should be serious and the other one-fifth (20%) explain their concern that they prefer not to communicate with classmates through games (Fig. 5).

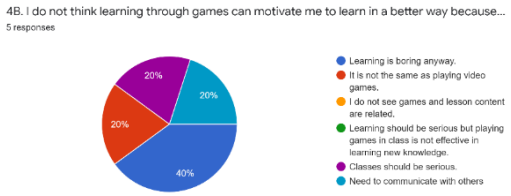

Fig. 5. Reasons why gamification fails to motivate students to learn better.

B. University Students' Recount of University Teachers' Experience in Using Game-Based Platforms and Other Innovative Digital Tools in Both Virtual and Face-to-Face Classrooms for English Language Subjects

Among all the game-based platforms, more than half of the student respondents (55.4%) recall the experience of having their English Language teachers using "Kahoot" in virtual classrooms in both online classrooms during the pandemic and face-to-face classrooms before the pandemic. Shared document serves as the second most common digital tool in English Language classrooms, which constitutes almost one-fifth (18.5%) of students have the experience in being asked to use shared document. 7.7% have experienced roleplays in English Language classes, followed by 4.6% have used storyboards before. A small minority (3.1%) have used Class123. The other 3% indicate that they have been instructed to use Soqqle and Flipgrid, with 1.5% students out of 3% revealing their English Language teachers have used Soqqle and Flipgrid respectively. 5.5% reveal that they have never experienced any digital learning tools in classrooms except Zoom as the major communicative classroom platform during the pandemic in Hong Kong (Fig. 6).

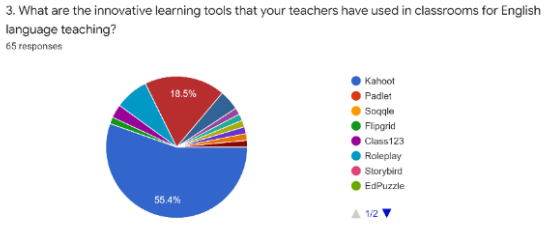

Fig. 6. University students' recount of using different game-based platforms in English Language classrooms.

Ref. [3] points out that teachers experiment different digital teaching strategies which focus on visuals such as images, paintings, colours and shapes; auditory through rhythms, chants and tones; and kinesthetic like body movement and gestures, in order to help students to stay engaged with the taught materials in the remote learning. Among all, one of these teaching strategies is learning through gamification. With reference to the comparison of frequency of usage of various games in online classrooms and physical classrooms, 34.8% of student respondents believe that teachers have been incorporating games in online classrooms as much as face-to-face classrooms. While 33.3% claim that there are more games to be designed in physical classrooms, 26.1% recall more games have been incorporated in online classrooms during the pandemic instead. Only 5.8% cannot recount their learning experience in relation to learning through games in classrooms (Fig. 7).

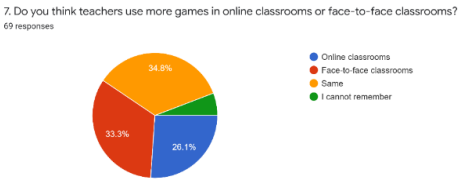

Fig. 7. University students' comparison of teachers' usage of games in virtual classrooms during pandemic and face-to-face classrooms before pandemic.

C. "Kahoot" is Favoured as the Most Popular Game-Based Platform in Digital Learning among University Students and Teachers in Hong Kong

Among all the game-based platforms, Kahoot is regarded as the most popular game by English Language teachers in both online and face-to-face classrooms. It has a user-friendly interface that requires low level of technical expertise and the use of "Kahoot" increases undergraduate students' motivation because of its easy-to-use implementation [4]. From the before and after tests, "Kahoot" was concluded to be one of the most effective digital tools which encouraged creativity and innovation [4]. In the studies, it was found that active participation of students stimulated their imagination and their creative capacity to make their own tests and learn from those made by their teachers and classmates. In other words, Kahoot successfully increases students' engagement and motivation to learn and their ambitions for success as it creates a stimulating and competitive environment in which students actively participate. In fact, both students and teachers can create a positive learning experience in a clear and understandable way using only pictures, videos and questions to foster an intensely innovative social learning experience. Furthermore, "Kahoot" is easily accessible by any device with internet connection, smart phones, tablets or laptops. It thus promotes a type of synchronous interaction that encourages real-time collaboration and fosters a sense of community, promoting participatory evaluation that favors the development of cross-disciplinary skills [4]. Furthermore, "Kahoot" and other similar innovative tools been shown to improve students' ability to form the meaning of new information with curiosity to learn more and make decisions, as well as to draw conclusions that help achieve learning outcomes. The results obtained in also confirm students positively value the use of this digital platform, which in return promotes the adoption of these motivating ICT proposals in similar contexts later [4]. With regards to the data on the digital competence of learners, it should be noted that the participants welcome these online proposals and feel able to master this platform in terms of understanding game options, basic instructions and question formulations. More importantly, no specific training or complex technical knowledge is required [4].

D. University Students' Comparison of the Effectiveness of Gamification in Virtual Classrooms during the

Pandemic Versus Face-to-Face Classrooms before the Pandemic

In this view, there is a significant remark that the popularity of gamification in classrooms lies in face-to-face classrooms more than online classrooms, while there is a similar proportion of student respondents reckon that teachers use games in online classrooms as much as face-to-face classrooms. This illustrates that gamification is not an exclusive approach to be commonly used in virtual classrooms by English Language teachers in universities and colleges in Hong Kong only during pandemic era. On the other hand, contexts and localities of teaching are never factors in governing whether to adopt gamification in classrooms or not, with or without the impacts from the pandemic and social distancing measures in the society. Considering a small proportion of students fail to recall their learning experience as shown from the questionnaires, the success, effectiveness and limitations of incorporating gamification in learning and teaching will further be analyzed.

IV. Analysis

A. The Necessity and Need for Gamification in Online University Classrooms during the Pandemic and the Possibility of Transformation from Traditional Teaching Practice to Game-Based Learning (GBL)

The promotion of game-based learning (GBL) has undoubtedly changed academic environments and traditional teaching styles by significantly modifying the roles of teachers and students [4]. In particular, GBL implies more active participation in these learning processes with regards to students, who responds more effectively to their current interests while improving digital literacy and promoting quality and sustainable education [4]. To achieve these objectives, the emergence of new teaching and learning models has encouraged educators, as social actors, to adapt to the needs of learners so as to create conditions suitable for developing more motivating and innovative practices [4]. Today, remote controls are no longer necessary because smartphones, tablets or laptops favor the implementation of these systems due to wireless connections, applications and websites. Therefore, content knowledge and fun can be merged into daily lessons without the need for other intermediate devices due to the advancement and application of Information and Communication Technology (ICT). A variety of high-quality online platforms can be found such as “Kahoot”, “Socrative”, “Quiz”, “Acadly” or “PollEverywhere” and inter alia on the internet [4].

Nevertheless, it poses a challenge to discover the dichotomy and contraction between the internalization of necessity of gamification in various modes of classrooms by students and teachers, and the success of gamification in virtual classrooms versus face-to-face classrooms in enhancing the effectiveness of learning and motivations of university students, especially during the pandemic in Hong Kong. Some interviewed students hold the view that online games are equally popular in face-to-face classrooms to online classrooms. Likewise, games in face-to-face classrooms are as much as being adopted by teachers before the pandemic in Hong Kong when compared to online university classrooms during the pandemic in Hong Kong. While it may be deduced that the trend of incorporating different games in university classrooms to make the classes more fun and lively has been commonplace due to the global pandemic, while some students reveal that the process of gamification is actually smoother and more effective in face-to-face classrooms even before the pandemic when online mode of classes have not been adopted. This conforms to the earlier findings that more than one-third of student respondents (34.8%) highlight their English Language teachers have been incorporating games in online classrooms as much as face-to-face classrooms. Similarly, slightly more than one-third (33.3%) recall that more games have been incorporated in their formal face-to-face classes for English Language acquisition. While it may be expected that gamification is getting more popular in online classrooms as digital learning has become the prevailing norm in education across different disciplines and sectors accelerated by the global pandemic, games of different categories and pedagogy have been popular in fact for long in face-to-face classrooms even before the outbreak of the pandemic.

Rather than a surge of popularity of gamification in virtual classrooms, only approximately one-quarter (26.1%) of the student respondents recount their memory of having more games in online classrooms in their learning experience in universities or colleges during the pandemic period aforementioned. A few interviewed students also conclude that games in online classes cannot serve the purpose of attracting students’ attention during class fully, which means that gamification is a less significant and dominant driving force in motivating students to learn in virtual classrooms since face-to-face presence promises students’ attention span. In addition, it is suggested there is a possibility that some university students may just simply ignore the game playing part in online classes. However, teachers can ensure every student is engaging in the assigned games in face-to-face classrooms due to the physical presence. In this light, gamification is not the solely effective way to facilitate students’ interaction with their fellow classmates and teachers as much as expected. Games cannot guarantee all students are entirely participating in the whole lesson during either online or offline classes.

B. University Students’ Preference of Various Gaming Tools and Perception of the Factors for Teachers not Adopting Gamification Approach during English Language Classes

Regarding the categories and nature of games to be incorporated in virtual learning, almost half of the student respondents (47.8%) claim that they prefer both competitive and collaborative games. More than one-fourth (26.1%) vote for competitive games, which compose of the competitive elements among classmates. Level-up games in which students need to proceed to different levels are only popular among less than one-fifth (18.8%) of the student respondents. Collaborative games come to the least popular, in which only 7.2% of university and college students in

Hong Kong prefer teamwork during class activities (Fig. 8).

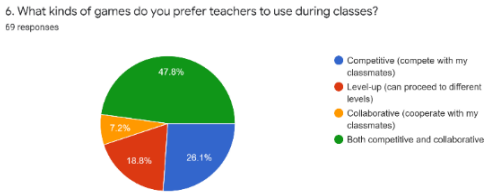

Fig. 8. Categories of games preferred by student respondents.

It is found that university and college students in general have the perception that time is the dominant factor for the absence of gamification in university classrooms by teachers. Less than half of them (41.8%) believe that teachers lack time to prepare for games to be incorporated in classrooms, especially during the pandemic era. However, almost one-fifth (19.4%) perceive their English Language teachers are not synchronous with the concurrent trend and thus gamification in classrooms is not adopted. 16.4% account their teachers may not understand the importance of games, while 10.4% interpret their teachers may not know much about games and 9% believe their teachers may not comprehend the importance and need of games. 1.5% indicate the absence of games in classrooms is due to the difficulty in designing different games for some specific subjects like literature and statistics (Fig. 9).

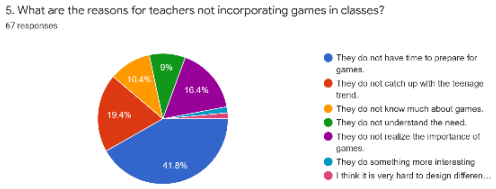

Fig. 9. Reasons of university teachers not incorporating games in both virtual and face-to-face classrooms from students' perspective.

C. University Students' Perception and Attitude towards Gamification in General in English Language Classrooms in Hong Kong

It is interesting to summarize that university students generally equalize whether lessons are fun and interesting as the determinators for their intrinsic and extrinsic motivation in learning. Most of them assess whether their learning experience is effective or not mainly on the basis whether their teachers can keep their attention long during the entire classes. In addition, physical sensations to physical body and positive psychology both play the essential roles in motivating university students to learn better in classrooms. Apart from the fun nature of games as the chief motivator, the second most important reason to support games to be incorporated in classroom learning is due to the intrinsic nature that visuals and colours in the design of games are more sensationally powerful than plain words, followed by learners' desire to win their peers as the third key cause in their conclusion that gamification can motivate them in both virtual and face-to-face classrooms. In other words, it is obvious that traditional classrooms with teachers' one-way lecturing and teacher-centered classrooms are no longer enough to satisfy students' need for innovative learning as the new trend nowadays, especially with the acceleration of digital learning impacted by the outbreak of pandemic across the world. [5] identifies gamification as "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems".

An active learning context refers to the various learning approaches and instructional methods such as experiential learning, collaborative learning, cooperative learning, case-based, inquiry-based, problem-based, team-based and game-based learning. These different models cover the subset of active learning. Hence, active learning is an umbrella concept that encompasses the different learning approaches and instructional methods of learning [2]. As aforementioned, almost half (47.8%) of the university and college students respond they prefer both competitive and collaborative games, followed by competitive games as the second most popular type of games (26.1%), then level-up category of games (18.8%), and finally collaborative games (7.2%) come as the least popular kind. From the collected data, it is illustrated that university students have greater expectation on the variety of games that they can be exposed to in classroom learning owing to the commonplace digital learning and technological competency. Competitive games in which students compete with their fellow classmates and level-up games require players to proceed to advanced levels progressively are more popular than collaborative games comparatively. By examining the demographic background of the targeted respondents and interviewees, these groups of university students belong to a group of more advanced and mature learners than the younger learners before the admission to tertiary education. This can be explained by the psychological behaviours of learners, who are academically and mentally stronger students from dominant universities in Hong Kong, and simultaneously having the experience in surviving through public examinations, tend to be more habitual to the competitive learning environment and thus are relatively more self-driven to win. On the other hand, collaborative games such as games relate to teamwork are regarded as less popular among these student groups. This can imply these student respondents in general may imagine their fellow classmates as academic rivals rather than teammates to collaborate and cooperate with. Level-up games are also popular due to the sense of achievement and accomplishment that students can attain by proceeding to another level, which can also be impacted by the prevailing level-up concept designed in video games that students are always exposed to nowadays.

Many studies have proved that friendships play a critical pivot on students' social, emotional, and cognitive development. [6] finds that about 50% of students' achievement-related comparisons are made with their best friends and they often prefer to compare themselves with friends. Moreover, some studies indicate that friendship relations are a key role in maintaining positive interactions and alleviating negative interactions among students in a learning activity. Theoretically, friendship relations are beneficial for students situated in competitive learning environments, but friendships are still absent in relevant studies, especially on the surrogate competition [6]. Apart from friendship, some studies have also shown that gender

differences can impact the preference over competitive learning environments. Male students are relatively more highly motivated to participate in game-based learning environments than female students and boys tend to have higher incentive to attain higher scores in competitive games than girls [6]. This indicates gender stereotypes exist and thus play a role in students' learning attitudes, which corresponds to the demographic background of student respondents in the study that are mainly represented by mostly 72.4% males and rarely 26.3% females aforementioned. When students are involved in an effort-demanding activity like competitions, they need to improve their learning status to win and thus are guided to realize that winning is closely correlated to the level of effort they exert. This cause-and-effect relationship is helpful for the establishment of a positive attitude towards motivational learning [6], which is enabled by competitive gams in classroom learning.

D. University Teachers' Perception and Attitude towards Gamification in Virtual English Language Teaching Classrooms in Hong Kong during the Pandemic

From a more holistic perspective to analyze the practice and success of gamification in university classrooms, data from English Language teachers is also collected from university teachers' perspective towards the usage of games in classrooms. It is found that a majority of teacher respondents (62.5%) agree that gamification is an effective means to motivate students in universities and colleges to learn better, with 25% totally agree and 37.5% strongly agree that incorporating games in classrooms is an effective approach to motivate students. In contrast, more than one-tenth (12.5%) strongly disagree gamification is successful in motivating students while one-quarter (25%) are neutral towards gamification in both online and face-to-face classrooms (Fig. 10).

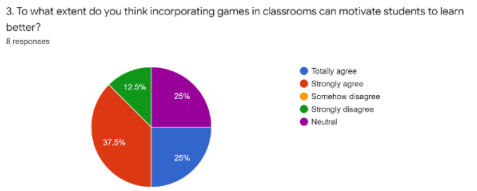

Fig. 10. University teachers' perception towards gamification in motivating students to learn better.

It is clearly indicated that a majority of teacher respondents (62.5%) hold the belief of the necessity of positive reinforcement towards student motivation with the use of gamification in both online and face-to-face classrooms among universities and colleges in Hong Kong. However, the comparative findings between student respondents and teacher respondents also illustrate distinctive and different perceptions and attitudes towards learning through games among the two groups. As shown from the data analysis aforementioned, a majority of students (73.9%) think that incorporating games is a constructive means to help their effective learning in English Language classrooms, with the major concern about whether classroom learning is fun and interesting, which constitutes more than half of student respondents' (53.8%) need as learners for second language acquisition. In addition, almost all students (94.2%) claim that games act as remarkable incentive to draw their attention in classes of different modes and thus drive them to learn dependently inside and independently outside classrooms. Meanwhile, viewing the teachers' attitude towards the incorporation of games in both virtual and physical classrooms, more than half of university English Language teachers (62.5%) internalize the importance of gamification and other digital teaching tools as the current and upcoming innovative trend and thus there is a need to adopt a more interactive approach for students by devising new pedagogy in relation to digital technology in order to supplement or even replace one-way lecturing in traditional classrooms. Systems that only focus on lecturing and other traditional teaching strategies produce passive learners. "Spoon feeding" techniques in traditional classrooms tend to suppress students' creativity and neglecting their strengths as students are highly dependent on their teachers' lecturing instead of independent thinking [3]. One-way lecturing also demotivates students to learn effectively if lessons are found to be dull and boring. In general, students prefer games to be incorporated in all classrooms more than teachers, given the intrinsic nature of collaborative and competitive games as motivators in getting students to work with peers, with 31.7% difference regarding the popularity of game usage between university students and teachers.

The statistics also demonstrate that all university teacher respondents have the experience in running their English Language classes with gamification, as shown from the questionnaires that none of any individual teacher respondent claims he or she has never used games as teaching tools in university classrooms (Fig. 11). Nevertheless, when it comes to the practicality and frequency of the usage of games in English Language contexts, only half of them (50%) incorporate gamification in classrooms generally for a few times every semester for English Language teaching. It is implied that approximately 15% to 35% of teachers' total class time have been devoted to the practice of gamification in university classrooms given there are 13 to 14 weeks in every semester. One-quarter (25%) recount that the elements of games have been included in the teaching of English Language courses for more than half of the semester, which means this group of teacher respondents have spent half of the total class time on incorporating games in university classrooms to motivate students. On the other hand, only more one-tenth (12.5%) of university teachers design their English Language classes once every week and the other 12.5% conduct games in classrooms once every two classes respectively.

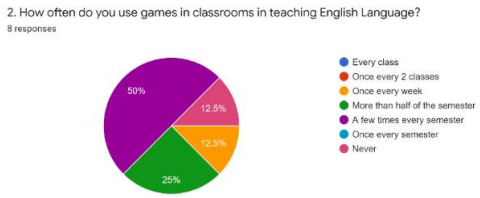

Fig. 11. Frequency of the usage of game-based platforms by university teacher respondents in each semester.

While a vast majority of university teachers (87.5%)

reckon incorporating games in classrooms of any form is constructive in helping students to learn more effectively and positively (Fig. 12), there is also a majority of 75% teacher respondents believe games motivate students to participate more fully in class and learn better (Fig. 13). On the contrary, 12.5% of university teachers think gamification is not effective for students to learn better while 25% regard gamification cannot motivate students. It is concluded that there are striking differences between educators and learners among universities and colleges in Hong Kong, with reference to the different perceptions and attitudes towards the necessity and the effectiveness of gamification towards effective learning and motivator of learning among the two groups of respondents.

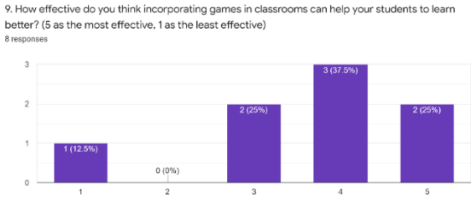

Fig. 12. University teachers' perception of gamification towards students' effective learning.

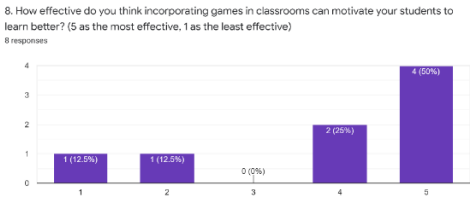

Fig. 13. University teachers' perception of gamification towards motivating students' learning.

E. University Teachers' Comparison of the Effectiveness of Gamification in Online Classrooms during the Pandemic Versus Face-to-Face Classrooms before the Pandemic

Most interviewed teachers believe that student engagement is the major concern in terms of effectiveness in using games online and face-to-face. It is easier for teachers to engage with students in face-to-face classrooms due to their physical presence in concrete settings. In contrary, it is harder for teachers to build rapport with students when the lessons go online, making teachers' assessment of students' learning progress sometimes more difficult. While students can occasionally switch off cameras on Zoom in virtual classrooms, teachers can walk around in the face-to-face classrooms to establish a sense of presence. Thus, implementation of gamification becomes more inclusive for each student in face-to-face classrooms, in which both active and passive learners are more motivated by gamification in physical classrooms compared to virtual classrooms, making learning more direct and effective. Nonetheless, there is a possibility that gamification can exclude the passive learners in online classrooms since it is more challenging for the teachers to supervise every student online. Meanwhile, a few interviewed teachers advocate that the ease of incorporation of games in online classrooms and face-to-face classrooms are both at a similar level. The most dominate factor relates to the positive psychology among university students that learners are in general attracted by the nature of games and fun lectures. Furthermore, the content of the lecture is always very much the same and materials are delivered via the similar platform.

F. Limitations of Gamification in BOTH VIRTUAL and Face-to-Face Classrooms

Most student interviewees hold the view that there would be variation in respect to the effectiveness of game usage in online and face-to-face classrooms. Most of them reckon that gamification is more effectively implemented in face-to-face classrooms before the pandemic rather than virtual classrooms during the pandemic in tertiary education in Hong Kong. Interestingly, it is generally believed that learning through collaborative games is more effective in face-to-face classrooms than virtual classrooms as shown from the fact that most student interviewees internalize the notion that face-to-face classrooms promote collaboration and effective communication in comparison to remote learning. Apart from collaborative games, it is also stated that competitive games online may be less fun and interesting than games in face-to-face classrooms, explained by the difficulty of online classrooms in establishing a competitive environment to encourage students to engage in competitions. Comparatively, face-to-face communication enables learners to interact and accomplish given tasks collaboratively in an easier and more comfortable way, providing the concrete physical settings which allow spontaneous and direct communication instead of potential communication barriers in intangible virtual channels. Hence, face-to-face classrooms facilitate both collaborative and competitive games more effectively in helping and motivating students to learn better than online classrooms.

In addition, online classrooms pose a challenge for teachers to create a positive and proactive learning atmosphere and thus is more difficult to set up the mood for game playing in virtual classrooms. Furthermore, the difficulty in implementing gamification to all students in online classrooms without excluding any passive learners is a crucial hinderance for student engagement. This includes the constraint in monitoring whether students are following house rules during online classes since some students can possibly turn off the cameras and mute themselves. One interviewed student cites an allegory that lecturers can spot out any student in physical classrooms who is not paying attention and thus the internalization that students should listen and respect the lecturers can in return facilitate students to concentrate better and reinforce students' full participation in face-to-face classrooms. One interviewed student has internalized the idea that online learning is dull and boring anyway and he is always distracted at home especially when he is sitting in a comfortable private area. It is generally believed among university students that they and their fellow classmates are more proactive in face-to-face lessons. This corresponds to some interviewees who proclaim that learning through games would be more "interactive, exciting, fun and attractive" with face-to-face and direct communication since the sense of student

engagement increases behaviorally and emotionally in physical classrooms. It is also said that face-to-face classrooms serve the purpose of triggering more interactions between teachers and students and among students, which result in better student-teacher and student-student rapport.

On the other hand, the technological nature of virtual classrooms hinders the effectiveness of incorporation of games in digital learning experience. Among the interviewed students, it is believed that they sometimes experience delay of response from teachers and classmates due to internet connection problem in remote classrooms, and thus reckon face-to-face learning to be more direct and thus effective.

G. The Gap between University Teachers' Acknowledgement of the Vitality of Gamification in Classrooms and the Frequency of Its Usage in Practicality

Given most university teachers recognize gamification as a constructive, effective and innovative means in facilitating students' learning, it is indicated that only 12.5% of teacher respondents incorporate games in their English Language courses once every week and once every two classes respectively. Likewise, none of any teacher respondents disagrees that gamification in classrooms is effective in motivating students to learn (Fig.13). The limitations of the practicality of gaming in both online and face-to-face classrooms can be justified by numerous obstacles in adopting gamification in university classrooms and other digital teaching tools. A large majority (75%) of teacher respondents hold the view that one major hinderance in incorporating games in classrooms is due to the tight teaching schedules (Fig. 14). Half of them (50%) believe that there is lack of trainings and resources received and somehow games and the content of courses are not interrelated (Fig.14). The third most common limitation (37.5%) is that there is limited access to different software and tools to support learning through games in classrooms (Fig.14). It is unavoidable that the use of realia and concrete props in classrooms are unlikely in virtual classrooms during the pandemic. Therefore, implementation of gamification in online classrooms requires more institutional support, trainings to be received and know-how of the technology than that in the status quo, which further limits the feasibility and scale of incorporating games in classrooms during the pandemic.

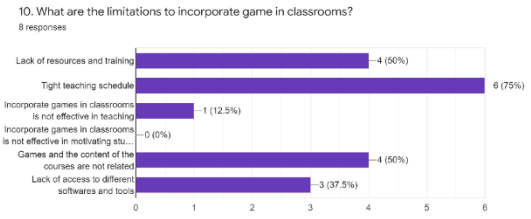

Fig. 14. Reasons of the absence of games in classrooms from teachers' perspective.

H. Effectiveness and Practicality of Game Incorporation in Virtual Classrooms Versus Face-to-Face Classrooms

Regarding the kinds of innovative teaching tools used in classes so far, most interviewed university teachers name a few including "Zoom polling", "Zoom whiteboard", "Kahoot", "Padlet", "Word Clouds", "Everything Poll", "graph Drawing", and "Lucky Draw". It is also highlighted that "Kahoot", "Padlet", "Spotify", "Word Clouds" and "Lucky Draw" are teachers' preferred tools in both online and face-to-face classrooms for English Language teaching in universities and colleges in Hong Kong. From the results of interviews of teacher respondents, it is revealed that university teachers who deploy the concept of gaming in classrooms are in the purpose of enhancing spontaneous interaction and participation among students. It is also relatively easy for both teachers and students to use these game-based tools. On top of the interactive nature of gaming in classrooms, concepts can be visualized to students more easily and effectively with colours, symbols, graphs, shapes, videos and music through games.

In addition, the interviewed teachers hold the belief that games are catchy to students' attention and teachers can make use of gamification to monitor whether students are attentive in class at that time. However, one interviewed teacher holds an opposite view by raising her concern that there is a possibility that some students may feel harassed by the compulsory gaming in classrooms and students may also believe learning should be serious instead. Most interviewed English Language teachers explain the usage of games in classrooms can be hindered by the fact that the application of games and other digital tools rely too much on the content of the subject knowledge at that time. Ideas and inspirations from games can be interrupted by the lack of originality. Besides, the unstable internet connection for teachers and all students poses a threat in smooth adaptation of games in online classrooms during the pandemic in particular.

While gaming tablets and social media have been a major part of students' life, teachers face a significant problem towards students' motivation and achievement inside classrooms. Learners get easily distracted and can show a loss of interest, and communication between students and teachers becomes remote and fragile, especially with the distancing learning during the hit of pandemic [3]. Some teachers even find digital platforms discouraging, as they have to do extra work to adjust the pace of the classes to achieve a better understanding of the content for students. This requires enormous effort both inside and outside classrooms in order to integrate the digital content into lesson plans. This also requires the intensification of educational adaptations made in classrooms to promote content learning by all students in a comprehensive and meaningful way. Another disadvantage pointed out in some studies is linked to the negative attitude of some students to these digital challenges, since not all students prefer to play an active role in classrooms [3]. In fact, some of them feel more comfortable taking notes and studying content after classes without using their mobile phones for academic purposes because they fear making mistakes in public when using this digital resource or not feeling supported by their peers when being asked about content previously worked on in public [3]. Further research and information on the application of these innovative proposals in higher education contexts is therefore needed to better understand and adapt these ludic strategies to the main interests and demands of students in higher education.

V. Conclusion and Limitations

With the research analysis, gamification in classroom learning has been an unavoidable trend in education. With data collected from both learners and educators towards English Language learning in tertiary education in Hong Kong, the future research can be extended to compare the data analysis from both pre-and post-tests, with the integration of different games for experiments into the teaching process to assess the level of university students' active participation and motivation towards a more interactive and stimulating environment. It is also recommended that more resources, trainings and technical support can be offered by the authorities and educational institutions to pursue the sustainable game-based learning and provide a more engaging and interactive environment for learners in the new technological era.

Conflict of Interest

The author declares no conflict of interest

Author Contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Sumie Chan and Noble Lo. The first draft of the manuscript was written by Sumie Chan and Noble Lo and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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