Advances in Education: Using a game-based learning platform in the online learning environment

Technology, in recent decades, has advanced at an exponential rate and, for experienced educators, the arrival of technology such as mobile phones into the classroom, did not arrive without problems. Where students persist in bringing them out in the class educators often remind them that the phone will not help them when they sit their exams. However, with the emerging research into the use of game-based learning platforms such as Kahoot,! which examines the benefits and drawbacks of using such applications, it is difficult to ignore this type of technology. There are many reasons why using game-based learning technology is becoming more popular, but the main reasons are that students nowadays have been introduced to technology, such as online games from a young age, and have constant access to a personal mobile phone. In 2020 technology was embraced for this study and was introduced to in-person classes as a way of engaging students and, when delivery was moved online as a result of the pandemic, Kahoot! continued to be used in the virtual classroom. This study compares students' perception of Kahoot! as a learning tool in the virtual classroom, its use when delivery returned to a blended learning environment where students were taught both in-person and online, and when it is used in the face-to-face environment. The study evaluates whether students benefit from using Kahoot! as an aid to their understanding of the subject and if they viewed it as a game or as a learning tool. This paper explores the views of three distinct groups of students' use of Kahoot! in their learning environment: when used in an online only teaching environment, in a blended teaching environment consisting of online and in-person delivery, and for an in-person only teaching environment.

Key words:

Online game-based learning; Kahoot! student engagement; Covid; online learning environment

USING A GAME-BASED LEARNING PLATFORM: IN THE ONLINE LEARNING ENVIRONMENT

Game-based learning can be defined as learning through playing games designed for educational purposes[1], with the intention of increasing student engagement in the classroom, and educators have been encouraged to research various pedagogies in order to retain students attention. The delivery of information to students by reading prepared slides, in the classroom, is the teaching method of the past. The emergence of "gamification" of learning has been shown to increase student engagement by appealing to all students, even the most introverted, combining both a cooperative fast-paced learning environment and friendly competition (Kapp, 2012)[2].

THE CURRENT SITUATION

Game-based learning platforms have been used in classrooms in recent years as a teaching strategy intended to engage students. A myriad of technological options can be used to support digital game-based learning. One popular technology in this context is the mobile device, considering its high penetration rate in our societies, even among young people[3]. There are many benefits to using this type of engagement tool for both the educator, to be able to assess if they are delivering knowledge in a way that students are able to understand and retain that knowledge, and for the student to easily self-assess their understanding of a topic and testing the retention of that knowledge.

Currently, the main conclusions from a number of studies is that Kahoot! has a positive effect on learning compared to traditional tools such as Blackboard and slides[4.] This study also briefly discusses the topic of student anxiety and found that the use of Kahoot! as a means of testing student knowledge decreased student anxiety. A previous study[5] found that Kahoot can, in fact, have a positive effect on learning, motivation, and concentration. The study also considered 14 of the 93 studies included in their review which focused on anxiety and found that 10 of the articles concluded that there was a reduction in student anxiety due to, in part, the removal of the feeling of being judged.

This study focusses on the use of Kahoot! which is an online game-based learning platform launched in 2013 by Mobitroll, a collaboration formed between We are Human, a British company, and the Norwegian University of Science[6]. An individual quiz is created for each topic delivered and these individual quizzes are known as a Kahoot! Each Kahoot! used in this study were made up of between 10-15 questions and created specifically to test students' retention of knowledge from a lecture. Once a Kahoot! is created students can access the quiz in real-time, either virtually or in-person, and the game is played. Students can choose a username, instead of their own name, which means that participants are able to remain entirely anonymous thus creating a safe learning environment which helps minimise student anxiety when taking part.

The individual questions in each Kahoot! are time-constrained and the correct answer is displayed at the end of the specified question time. The students chosen usernames with the highest scores (combination of all answers) are displayed on screen following each question. The displayed results shown alongside the username can be used for the lecturer to commentate on as a means of introducing an element of fun to the lesson and to encourage student engagement. There is also the opportunity for the lecturer to provide the solution to the question on screen with the opportunity for the lecturer to provide a verbal explanation where scores are particularly low. It is also an opportunity for students, who provided an incorrect answer to a question, to seek further clarification on a topic from the lecturer.

At the end of the game, when all questions have been attempted the three students with the highest scores are displayed alongside a medal podium: gold, silver, and bronze.

FIGURE 1: Creating a Kahoot! process
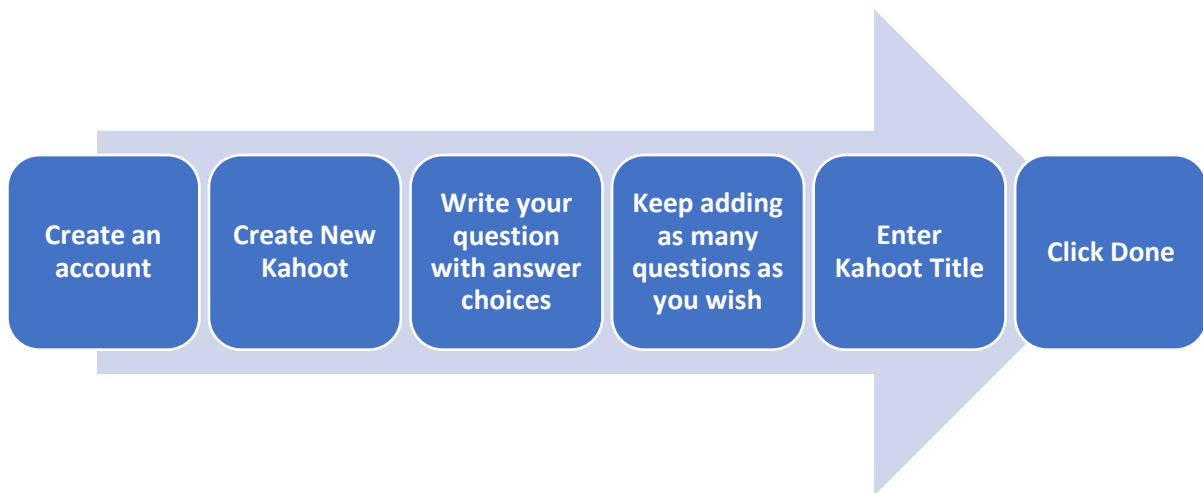
For this study Kahoot! was chosen as the preferred game-based learning platform for a number of reasons: it is free for the basic package for both the creator (educator) and the users (students), it is also easily accessible as it uses the Cloud and works with most devices, including laptops and Chromebooks in additional to mobile phones. It is useful for the creator for a number of reasons including the speed of creating an individual Kahoots! even with basic IT skills in a short space of time. Each Kahoot! quiz can be named with an individual topic heading and questions relating to that topic can be created. In its simplest form the questions can have multiple-choice answers as well as true/false and yes/no options.

Figure 1 presents a guide to the process of creating a Kahoot! which commences with a new user creating a free account. The software is very user friendly with the user following the steps shown on the screen. Once the account has been created Kahoots! can be easily structured depending on the types and number of questions the user requires. The Kahoot! is then named and once the Done button is chosen the Kahoot! is ready to be used by the users intended participants.

FIGURE 2: A unique pin code is generated for each Kahoot!
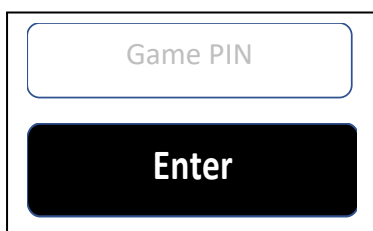
When a Kahoot! has been created the new 'game' generates a unique pin code as shown in Figure 2 and students simply access Kahoot! and enter the pin code to play the game. The benefits for students include the anonymity it provides as students can remain anonymous which encourages most students to play. There is also the element of competition as scores are generated and the top scorer is shown after each question and it motivates students by testing their knowledge retention of a topic.

INTRODUCING A GAME-BASED LEARNING PLATFORM

The study aims to look at the gap between exploring Higher Education students' perceptions of the learning environment which includes a game-based learning platform as part of the teaching strategy. The methodology will be discussed, followed by the study's' findings and discussion with reference to the wider literature which claims that today's students expect to

be engaged by their educational environment with sensory-rich and participatory learning activities[7]. Kahoot! was first introduced into classes for this study in 2020 when it was believed that the advancement in technology had resulted in a change to students' attitude to their learning. Physical attendance at classes and a reliance on access to textbooks were no longer accepted as the key to educational attainment. Students are able to access most materials through their university Virtual Learning Environment (VLE) and are able to sit passively when they do attend knowing that they can access the material being delivered post class. Students also have access to that technology in the classroom through iPads and other forms of electronic communication and more interactive electronic methods of delivery are necessary to increase student engagement in the classroom.

The decision to use Kahoot! was made as it appeared straightforward to use and because the questions students would be expected to answer would not be as time-consuming as questions needing calculations to arrive at the answer. A Kahoot! quiz was created for use at the end of a 2-hour lecture for the entire 10-week length of the module, the number of participants during each 'game' were recorded, and a questionnaire was distributed at the end of the module.

TABLE 1: The Use of Kahoot! in the Learning Community Framework

	2020 Online only DURING COVID	2021 Blend of online and on-campus RESTRICTIONS LIFTING	2022 On-campus only THE SITUATION
The student-student relationship	• Group virtual interaction • Breakout room interaction • Element of competition	• Group virtual interaction • Breakout room interaction • In-person groupwork • Learning community – competitive element increased	• In-person groupwork • Learning community
The student-lecturer relationship	• Group interaction • Main room • Breakout room • Assessment of understanding of topics delivered	• Group interaction • Main room • Breakout room • In-person interaction • Assessment of understanding of topics delivered	• In-person groupwork • Learning community • Individual contact • Assessment of understanding of topics delivered

Table 1 presents the learning community framework between students, and also between the student and the lecturer from 2020, when the arrival of the pandemic closed universities, through to 2022 when all restrictions were lifted and universities reopened. In 2020 the learning environment was moved solely online which resulted in virtual interaction only in the online classroom between students and their fellow students, and between students and their lecturers. As a result, an enforced change from traditional in-person teaching and engagement

strategies took place and strategies which relied on technology were introduced and implemented.

ADAPTING TEACHING STRATEGIES IN RESPONSE TO COVID-19

In September 2020, as a result of the pandemic, universities closed, and teaching delivery was moved entirely online. This proved a challenge for lecturers as the traditional form of teaching was removed with no face-to-face interaction with students and meeting the new cohort of students became virtual meetings. This removed the opportunity for in-person rapport and the relationship building which occurs naturally in the traditional in-person student-lecturer relationship. Instead these relationships were forced to be built at a distance and in a virtual environment for the first time. This instigated a necessary change to the teaching delivery and the module content was deliver via recorded lectures which were then uploaded to the university VLE. Students were able to access and watch the recorded lectures prior to weekly 'live' online seminars delivered using Zoom.

The Virtual Learning Community

The first virtual only class of 2020 were a cohort of 24 MSc students who were highly engaged during virtual teaching sessions. These students had, as directed watched the relevant pre-recorded lectures each week and then attended the 'live' corresponding weekly online seminar delivered which was delivered using zoom. Every student attended the live seminar each week, and each student turned their cameras on and were engaged throughout the session. Seminar questions, based on lecture content, had been uploaded to the VLE prior to the online seminar with the expectation being that students would access and attempt the questions and bring their solutions to the live online class. Each live seminar commenced with all students being admitted to the main zoom room before being placed in groups and separated from the main room into allocated breakout rooms to discuss their answers to specific questions with each other. This provided the opportunity for students to feel that they were part of a learning community where they were able to meet their fellow students in smaller groups. At the end of a specific time all students were brought back to the main room where they discussed their answers with the whole cohort.

The online learning environment facilitated a student-to-student relationship by providing interaction virtually as a whole class and also enabled interaction in smaller groups in breakout rooms. A lecturer to student relationship was created in the main room, replicating an in-person learning environment as much as possible, and students were provided with a more informal and personal interaction with their lecturer when the lecturer entered each breakout room.

The blended learning environment

In September 2021 the restrictions that came with Covid were beginning to lift and students were encouraged to return to campus. A blended learning approach was adopted for this cohort where pre-recorded lectures were still in use for students to view in their own time and students were expected to attend seminars both virtually and on campus in person. Students were, once again, provided with seminar questions based on the topics in the lectures on the university VLE and were expected to attend a mix of virtual and in-person seminars to discuss their solutions to the seminar questions. Whilst blended learning involves some aspects of course delivery online, other approaches include the hybrid model which is a combination of online course delivery with face-to-face sessions; however, all students need to attend both modalities[8]. The return to campus highlighted specific changes in students' attitudes to attending classes, brought on by the change in the learning community, caused by the pandemic. In-person classes were poorly attended with an average of 60% of students

attending, and students were reluctant to put their cameras on during virtual classes which resulted in lack of engagement. However, educators had to be sensitive to students' preferences regarding camera use and the induced anxiety this can cause[9].

In the seminar sessions groupwork continued to be used to foster a learning community and it provided students with the opportunity to continue to build the relationships that had been initiated in the virtual breakout room sessions. The noticeable barrier to student engagement was that, unlike the 2020 online only classes, the 2021 students were extremely reluctant to put their cameras on during virtual seminars, both in the main room, and in the breakout rooms.

As shown in Table 1 the blended style of delivery built on the lessons learned during the online only delivery and students were also able to interact with each other in-person and not solely virtually. This helped students to feel part of a learning community and it increased engagement with the lecturer as students were able to meet with their lecturer face-to-face. Students were far more engaged in the on campus learning environment where there were fewer distractions and, being able to meet with their lecturer once again in person, meant a more personalised learning experience was enabled.

The Return to In-person Only

In January 2022, for the first time since 2020, all teaching was delivered in person, and students were expected to attend all classes on campus. Students, who previously had not been able to attend on campus and had received an online education for almost 2 years, were reluctant to return to campus for all classes, and, on average, only 60% of students attended for their first in-person on campus lecture. At this time all lectures and seminars were delivered on campus and face-to-face and, once again, opportunities were provided for better interaction between the student and the lecturer.

Table 1 shows that in 2022 students were able to develop in-person relationships with their peers as all classes were held in-person. This enabled students to collaborate with each other in the classroom assisted by their lecturer which enabled students to get to know each other, and to learn with and support each other. Students were able to build a relationship with their lecturers by speaking to them, once again, in person to ask questions, clarify points made in delivering. This enabled the building of a more valuable relationship with their lecturer than can be achieved when meeting in an online educational setting.

FIGURE 3: The Attendance Factors
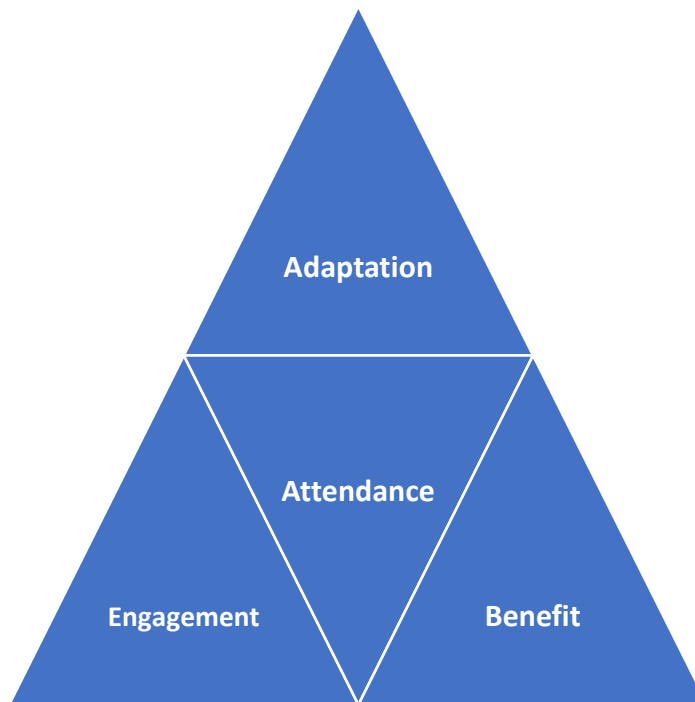
The lack of student attendance in 2022 throughout the university, even though restrictions regarding attendance on campus had been lifted, highlighted that there were attendance factors, shown in Figure 3, considered by students before they made the choice to attend in-person classes.

Adaptation – students, who had been asked to spend the previous 18 months adapting to virtual online delivery, were expected to return to an in-person learning environment, however, these students had become used to learning remotely. The adaption because of Covid had now become the norm which brought with it associated benefits such as saving on commuting time, parking issues and fuel costs. Many students had also made the decision to stay at home rather than locate accommodation nearer their university. Many feel increased stress levels and anxiety and depressive symptoms due to factors including the change of delivery of their courses, the uncertainty of university education, technological concerns of online courses, being far from home, social isolation, decreased family income, and future employment[10].

Benefit – if we define added-value as a term used to evaluate a students' perception of how much additional learning can take place, then students had to feel that there was an added-value to attending classes in-person. What extra benefit did students perceive they were receiving by attending in-person rather than online? At this time the decision was made to offer something in the classroom that would not be made available to students online and that was the introduction of Kahoot! at the end of each lecture. Although this had been available to the online only class of 2020 due to the pandemic, and for the blended learning class of 2021 due to remaining government guidelines, all restrictions were now lifted, and students had enrolled as in-person students. The use of Kahoot! was being restricted to in-person classes only with the intention being that the on campus learning environment would provide added-value and a reason to attend by promoting to students the possible novelties in instructional methods with the use of games[11].

Engagement – in this report student engagement is used in the broad sense in which to refer to students' attitude regarding their participation in the game-based learning activities. Experience has demonstrated that engagement takes place when students communicate and respond in the classroom. This can take many forms but usually when students are observed paying attention to knowledge delivery by taking notes and asking questions to aid their understanding. Letting students know that a quiz will take place at the end of a class has been shown to engage students. Kahoot! is a learning tool that has been used extensively as a motivator for students for the reason that they know that, when the Kahoot! is activated, it will test their knowledge and help either gauge their understanding or motivate them to ask questions and retain module content. Using activities and games in class encourages active learning, as well as collaboration, and interactivity[12].

Engagement is a two-way process and the use of Kahoot! in classes also helps the lecturer gauge students understanding and, where necessary, enables further information to be provided to aid that understanding by pausing the game when necessary.

LITERATURE REVIEW

Literature on the use of game-based learning platforms during the pandemic is currently limited however, in general, previous studies agree that using games to increase student engagement is appreciated[13]. The pandemic forced a change to the traditional structure for university students who, until universities closed, received all their teaching face-to-face, on-campus. Lecturers swiftly made changes to their current teaching strategies and were confronted with implementing changes to their previous teaching methods. Lecturers made decisions concerning which strategies could be adapted, when moved to online delivery only, and which strategies would need to be put on hold until a return to a form of blended teaching with some in-person delivery. Often online and blended teaching are treated as being the same, but they are not[14].

A literature review of the use of Kahoot! in the in-person classroom found that games like Kahoot! are an excellent choice for teaching university students given the access to mobile devices[15] however the review of the literature also found that, to some academics, the use of games in the classroom is considered to contain little scholarly merit[16]. A summary of previous literature does conclude that an eLearning platform results in students active participation in the classroom which results in an engaging learning environment.

The literature surrounding using electronic games during the pandemic and solely in the virtual learning environment is limited. Previous studies show that boredom in a computer learning environment can cause a lower level of learning[17] however, there is no precedent for a global online education situation and a review of previous literature has mainly been based on face-to-face teaching[18].

The literature research was undertaken by digitally searching for relevant studies and also researching the references found in those studies to enable further research to be undertaken. The research goal was to review previous studies on the effect of using Kahoot! in the learning environment and to research specifically the students view of such tools used in their learning experience. Following reading of the relevant articles information pertinent to the study was evaluated and included in the study.

METHODOLOGY

This study centred around using Kahoot! and its use in engaging students both in an on-campus and in an online educational setting. Account was taken of one of the most common arguments for the use of games for learning which focusses on its motivational power[19].

Between 2020 and 2022 a Kahoot! quiz was created for use at the end of a 2-hour lecture for the entire 10-week length of a module. At the end of each 10-week period of teaching students were provided with a questionnaire made up of 5 questions using Survey Monkey which was distributed online for anonymous completion.

- 2020 – online delivery only
- 2021 – a blend on online and in-person delivery
- 2022 – in-person delivery only

In total, the questionnaire was distributed to 78 students over a 2-year period compiled of 3 separate groups: 22 online only students, 24 receiving a blend of online and in-person teaching, and 32 in-person only students. The students came from different courses: 22 MSc students in 2020, 24 MSc students in 2021 and 32 BSc students in 2022. Although it was originally hoped that MSc students would make up the third group of respondents in 2022, due to Covid restrictions being lifted earlier than expected in January of that year, undergraduate students were recruited. The decision was made with the assumption that this broader demographic would enable a wider perspective awarded to the research questions in the study. Overall there was a response rate of 40% which was pleasing considering that 28% of students had not had the opportunity to meet with their lecturer and the author of the study in-person which meant that the relationship which naturally occurs between lecturer and student in the classroom had been unable to take place. The students also at this time, in addition to their course, had to grapple with how to learn the norms and behaviour of the university once again following a minimum of a 2-year absence from a university learning environment[20].

FIGURE 4: Using Kahoot! – The Decision Process
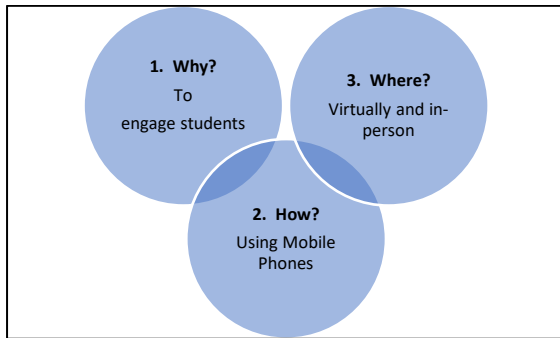
Extensive research highlights the importance of student engagement in their motivation to learning, and to many educators the use of electronic games in the learning environment represents an opportunity to re-engage students in the learning process[21]. Figure 4 demonstrates the reason behind using Kahoot! and how Kahoot is used in the learning environment. The main reason for implementing its use is as a way of engaging students, and that it can be used, providing participants have access to a mobile device, in-person on campus in the physical learning environment. Kahoot! proved useful during the pandemic as it was still able to be used in the virtual learning environment. In practice using Kahoot! is also inclusive as most students have access to a mobile phone.

Figure 4 shows why Kahoot! was introduced into the learning environment, how it was implemented for use in classes, and the learning environments in which it can be used. It also summarises how it is easily adapted for both virtual and in-person classes.

The why approach was the first step in the decision-making process and an evaluation of the available game-based learning platforms was undertaken. Previous studies were evaluated to ascertain previous literature and the effect of using such games in the HE student learning experience.

An evaluation was then taken before implementing step 2 which considered how students would access the prepared Kahoot! The deciding factor was that it could be available to students to access in their own time and outside of the learning environment, and also during 'live' classes. It was decided that to provide students with a perceived added-value to attending classes; whether 'live' on zoom or on campus, in-person that the Kahoots! would not be accessed from the VLE in students own time.

Step 3, linked to step 2, was which type of technology would be used. For reasons examined earlier, the Kahoots! were accessed and played via students' mobile phones, which are not just for talking – they are also for accessing the Web or watching video[22]. The 3 steps used to assess the overall learning behaviour of the three cohorts of students and that the overall learning path, student behaviour, and outcomes were fundamentally similar.

2020 Online only: In 2020 Kahoot!, which is as easy to use virtually as it is when delivering to in-person classes, was introduced at the end of each 'live' seminar delivered on zoom. It was used to continue to foster a sense of community which had worked, pre-covid, in the on-campus classroom. It was a learning tool used for online students to engage with their studies and to encourage friendly competition between students which had proved successful in the on-campus classroom. The intention was to replicate, as much as possible, classes online on a schedule similar to what was in place prior to the pandemic[23] .

2021 Blend of Online and In-person: To engage and motivate the students undertaking a blend of online and in-person delivery Kahoot! was used as both a learning tool and

engagement strategy as had been undertaken in 2020. As was evident in the previous year, students appreciated this form of interaction, as all students participated with the Kahoots!, and the same feeling of competitiveness was witnessed between students of the 2021 cohort that been seen with the virtual only students of 2020.

2022 In-person Only: Students returned to in-person only classes in 2022 and Kahoot! was once again used in the in-person learning environment at the end of each lecture and most students did use this game-based learning platform to check their understanding of a topic. Once again, the student comradery and competitiveness became apparent in the in-person classroom, and it was evident that once again learning communities were being built.

RESULTS AND DISCUSSION

TABLE 2: Questionnaire results

Questions		2020 Online Only	2021 Blend of Online and In-person	2022 In-person only
Survey Distribution	Students Respondents	22 67%　　(15)	24 33% (8)	32 25% (8)
Do you feel you benefitted from using Kahoot!?	Yes No	100%　　(15) 0%	100% (8) 0%	100% (8) 0%
Did it aid your understanding of the topics delivered?	Yes No	100%　　(15) 0%	100% (8) 0%	100% (8) 0%
Did you view it as a game or a learning tool?	Game Learning tool	33%　　(5) 67%　　(10)	12% (1) 88% (7)	50% (4) 50% (4)
Do you feel the use of Kahoot! encourages student participation?	Yes No	100%　　(15) 0%	100% (8) 0%	100% (8) 0%

Survey distribution

At the time of the study, and the collection of the data shown in Table 2, the education of over 1.5 billion students across the world were affected by COVID-19[24]. The study focussed on 3 groups of students between 2020 and 2022. In 2020, 22 students who were studying solely online were surveyed with a response rate of 67%. With a blend of online and in-person delivery in 2021 a total of 24 students were surveyed with a response rate of 33% and in 2022 35 students were invited to take part in the survey with a response rate of 25%

Do you feel you benefitted from using Kahoot!?

The data collected shows that 100% of the students who had completed the survey felt that they had benefitted from using Kahoot! in their classes.

Did it aid your understanding of the topics delivered?

This question following the previous question in the survey to find out if students had benefitted due to the use of Kahoot! aiding their understanding of the topics. 100% of respondents answered that it had been an aid in helping their understanding of the topics delivered.

Do you feel the use of Kahoot! encourages student participation?

In addition, 100% of students surveyed felt that the use of Kahoot!, at the end of a topic, encouraged student participation and, as a direct result, engagement both in online education and in the in-person learning environment.

FIGURE 5: Do students view Kahoot! as a game or a learning tool?
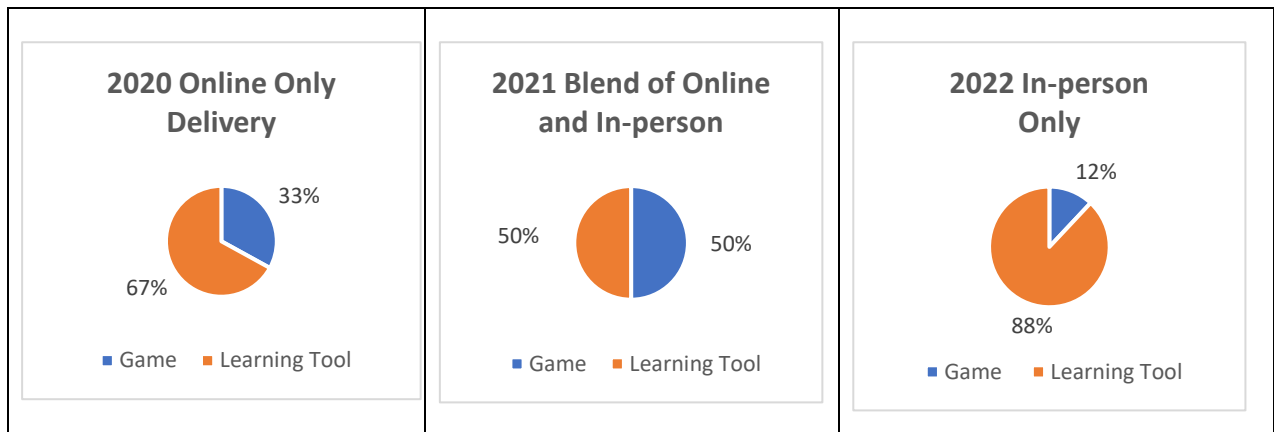
Introducing Kahoot! and its use in the learning environment causes educators to question whether students would view Kahoot! as a game or as learning tool. Figure 5 shows the results of the question: did you view it as a game or a learning tool? The study proved interesting as this was the only question where students differed in their answers. Perhaps it was unsurprising that both the 2020 online only group of students and the in-person only class of 2022 viewed Kahoot! more as a learning tool rather than a game. The survey results of the 2021 cohort of students who had experienced a blended learning experience shows that 50% of respondents found Kahoot! to be a learning tool which was a much lower result than the other cohorts in the study with the remaining 50% reporting that they found it to be a game rather than a learning tool. Where 88% of the 2022 cohort of students found Kahoot! to be a learning tool a conclusion can be drawn that the students surveyed in 2022 were more open and more familiar with using various online education tools. When we consider that this cohort of students had received the longer experience of virtual learning compared with the 2020 and 2021 students surveyed it is not surprising.

However anecdotal evidence shows that young people's use of ICTs differentiates them from previous generations of students and from their teachers, and that the differences are so significant that the nature of education itself must fundamentally change to accommodate the skills and interests of these 'digital natives'[25]. The study reinforces the previous literature reporting a positive response towards the use of game-based learning strategies for use with HE students as a learning tool as opposed to a game.

OTHER INSIGHTS: MORE DISCUSSION

The qualitative data from the study provided further information regarding the implementation of Kahoot! in the learning environment on student engagement.   Interestingly students questioned the technological barriers and one student commented that '*the use of Kahoot! in classes helped break down barriers to learning as it was anonymous, inclusive, and enhanced my student experience*'. One student commented that: '*Engaging with Kahoot! encouraged me to interact and I could gain experience in a different method of learning compared with more traditional methods used when I attend lectures and attempt seminar questions.*' Students were also appreciative of the use of different pedagogies used when classes were

being constructed with strategies aimed at engaging students in the online educational environment. Another student commented that '*the seemingly informal use of Kahoot! at the end of every online class meant that I felt part of a group and not isolated at home learning on my own*'. This validated the initial intention of using Kahoot! to both engage students and to foster a sense of belonging and part of a virtual learning community.

Using Kahoot! in a learning environment enables students to reflect on their own learning, and during questions where students used a guessing approach, they were able to take note of the correct answer. Students are able to use this information to develop their understanding and it also provides an insight to their own learning outcomes. It can be argued that multiple-choice questions provide students the prompts however this form of learning is valuable and has been found to be effective in improving the students' game-based reflection[26].

SUMMARY: HOW COVID ENCOURAGED ADVANCEMENT IN ONLINE EDUCATION

The arrival of Covid meant that most professional educators turned to technology to enable valuable learning environments to continue. Lecturers were forced to research previously personally unused pedagogies and embrace technology to enable learners to continue their studies. Educators across the world, overnight, changed their teaching practices, their tried and tested teaching strategies, their student engagement methods to ensure that students could continue to receive the best possible learning experience. Recently universities have, once again, became a place of learning, of wonder, of excitement, and welcomed the long-anticipated return to normality. Nevertheless, we would be wise to accept that technology has enabled advancements in online education in a shorter timeframe than previously anticipated and, it is in our students best interests, for educators to continue to embrace all that technology in the learning environment offers. Historically, games and dramatic performances as representations of real life have been shown to be effective as teaching tools. In the current educational climate and as a result of new technological advancements, there is a belief that traditional games have merely been replaced by electronic games[27].

CONCLUSION AND LIMITATION

This study into the use of Kahoot! as a game-based learning platform, has shown that attendance at class and reliance on textbooks is not the only route to academic success. Being back on campus and receiving in-person teaching is still widely appreciated by students and this is evident as our classes start to slowly fill up again. What is now needed is a teaching strategy which supplements existing teaching strategies and which include the adoption of online learning platforms such as Kahoot! This is another teaching tool which may be implemented in order to provide students with the opportunity to engage in classes and enhance their learning experience. In tandem, focus must be given to training on the learning outcomes expected from the use of Kahoot! in classes not forgetting that 'not all teachers have the skill sets needed for game design'[28]. This study has shown that, while the majority of HE students demonstrated a positive attitude towards the use of Kahoot! in their classes, for a minority, the use of Kahoot! was perceived as a game rather than a learning tool.

The contribution of this paper is the use of digital game-based learning, both in online and blended learning teaching strategies, particularly in encouraging a trusting relationship between the educator and the student. The majority of the previous research in this area has been undertaken prior to, and during, the pandemic. This study makes it different to previous studies in that it covers the use of Kahoot! in three distinct learning environments: when used online only when the pandemic forced universities to close and the learning environment moved online, during 2021 when students received a blended approach to their learning and students were able to access prepared Kahoots! both virtually and in-person on campus and

obtained students views when they, once again, were able to return fully to an in-person learning environment. The pandemic has given rise to an increase in the adoption of blended-learning strategies in the higher education environment. This was expediated, in part, by the pandemic but has also been increasingly used in recent years in schools and further education as well as higher education. This research identifies the use of Kahoot! in three distinct learning environments and the students surveyed views of the use of Kahoot! to increase student engagement.

The study also considered students attendance: when they were expected to return to the on-campus environment following and 18-month period of virtual delivery. It also evaluates students perception of the perceived benefit to their learning by being back on campus, and an emphasis on the engagement factor and their attitude to using Kahoot! as a student engagement strategy.

It must be acknowledged that this study is limited to the participants involved in this study and not reflective of HE students as a whole.

FOR FUTURE USE

The issue of how to engage students in the virtual environment, in the blended teaching environment and in the in-person on-campus environment continues to attract much attention in all education sectors. This study has highlighted the appreciation HE students have for a teaching environment which encourages student interaction and the subsequent benefits to their learning. The participants surveyed indicated that they benefitted from the use of Kahoot! in their learning as it aided understanding of the topics delivered and the majority of respondents viewed Kahoot! as a learning tool and not a game.

For future use, awareness must be given that for those students who view game-based learning platforms as games, as this type of teaching strategy may prove a barrier to students engaging with this type of learning tool in the classroom. Consideration must also be given for those students for whom the use of game-based learning platforms in the learning environment increases their anxiety. This study was undertaken as a result of the increasing student demand for blended learning in the HE environment and this should increase research in this area.

It is acknowledged that retaining students concentration and engagement during a lecture is challenging and educators must seek new teaching strategies to meet students expectations. This study is beneficial to educators in all sectors who wish to have an awareness of the ways in which a game-based learning platform can be used, both in-person and virtually, as an aid to increasing engagement and testing students' knowledge of the topic being delivered.

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