Implementing Educational Game in Pharmacy

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ABSTRACT

Educational games are a teaching strategy that allows students to examine various parts of a game as a method of learning. These are games meant of severe purposes instead of just entertainment. Through their design, education games allow students to gain new skills and knowledge, arouse physical activities, and enhance social-emotional development. Educational games require learners to participate in competitive activities with preset regulations. The objective of this study was to obtain pharmacy students' satisfaction and perception towards educational game implementation in the classroom setting. The author implemented a prospective study design that involved first-year pharmacy students at Princess Nourah bint Abdulrahman University (PNU). All the students who took part in the study were implementing this type of education for the first time. Thirty students were placed into two teams of 15 and took part in a jeopardy game. All the students were satisfied with the educational game. Key benefits of the game as noted in the study findings include improved cognition functions like memory and reasoning, promoted mental stimulation, learning was better and faster, improved concentration, recall, and thinking, resulted in motivation and more engagement with the team members, resulted in timed responses that were similar to real-life, promoted immediate scoring and there was no need to wait for the outcome, and the learning environment was quite fun. The study can be useful in designing educational games for use in pharmacy courses.

INTRODUCTION

What is an Education Game as a Teaching Strategy?

Research into gaming has exploded in the past period as people have started to recognize the perspective of game-based learning. Games are a pervasive part of life in many cultures, and there is a higher chance that they will become even more embedded in the coming years. Even though playing games is a fantastic leisure activity that is enjoyed by people of all ages, these tools can also be used for experiences of learning and education.[1] Hence, education games as a teaching strategy can be defined as a teaching approach that allows students to examine various parts of games in the process of learning. Teachers and other education specialists can design games in a manner that balances academic subjects, such as history, rules, as well as the social traits of playing a game.[2]

On many occasions, the use of games in education is often confused with the use of video games. However, these two types of games are different. They are designed at unlike levels of ability with the objective of helping the players retain the information that is learned and apply the information to other problematic situations. As such, many of the games used for education purposes are pertinent to real-life situations and help the learners to make informed decisions whenever necessary.[3]

Advantages of Application of Education Game at the University Level and in More Complicated Topics

Education games used at the university level motivate and engage the learners. In many circumstances, the games include rules, measurable goals, conclusive objectives, and competition. As a result, they provide learners with an interactive experience that encourages a sense of achievement. Students at the university are likely to be motivated by the many opportunities for active learning. The learners achieve a goal by choosing particular actions. Additionally, they experience the effects of these actions, which is one of the ways that the experiences of game-based learning become similar to real life.[4]

Education game provides an opportunity for the learners to experience immediate feedback. Instead of waiting for many days or weeks for an assignment to be graded, the learners get immediate results concerning whether they made a decent

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decision. What's more, they get to find out as soon as possible the longstanding impact of their decision making. A single decision at the start of a game could have an enduring impact throughout the play. Hence, the immediate feedback helps the learners determine whether they made a good or bad decision.[4]

Education game promotes cognitive growth. Each time the learners engage in a game, they perform cognitive activities, such as keeping track of hazards, remembering the rules, and recalling the progression of play works. The learners also develop solid problem-solving skills since they will need to think quickly immediately without hesitating. Additionally, the game teaches the learners to think creatively and to plan out their moves ahead of time.

Digital literacy, an essential life skill in contemporary society, is present in the education game. Through the game, learners acquire skills that help them solve problems, develop their creativity, think analytically, and collaborate with other learners. Not to forget, the games teach the students how to develop solid communication skills, accountability, and ethics.[5]

Disadvantages of Application of Education Game at the University Level and in More Complicated Topics

Even though educational games are useful, they can have disadvantages and affect learners both physically and mentally. Mostly, these games can cause physical strain to the learners. It is easy for learners to feel addicted to these games and sit for many hours at one spot while playing them. Long-term engagement in these games can result in neck aches, repetitive strain injuries, backaches, fatigue, as well as mood swings. This disadvantage can be resolved by encouraging learners to take breaks from educational activities.[5]

Educational games may also result in mental effects. Some learners may want to keep playing until they win or advance in the game. Such a determination can result in low self-esteem or rather the development of aggressive behavior among students who keep performing poorly in a game.[5] Teachers must also be cautious that the overuse of these games can result in social isolation as well as poor social skills among the learners.[5]

When implemented poorly, educational games can also become a key timewaster for some students. The games can take away the time that the student could spend studying. To minimize this impact, teachers and parents must set time limits for engaging in educational games to prevent the learners from wasting their time.[5]

Previous Studies Involved Educational Game in Teaching in Pharmacy/Health Colleges or any Scientific Field

Aburahma and Mohamed investigated the use of the educational game as a teaching instrument in the pharmacy curriculum. The authors conducted a detailed electronic search to reveal all the research articles associated with the use of educational games. They obtained data from databases, certain academic journals, search engines, and the reference section of the examined articles. The findings of the review provided adequate evidence that there is limited use of educational games to encourage learning in pharmacy schools. However, the authors acknowledged in their discussion that educational games can be used to complement and reinforce the materials that are taught in a pharmacy program. These games encouraged participation as well as engagement in a collaborative, enjoyable, as well as motivational environment for learning. The study also identified the key barriers to the increased use of educational games as the time consumed, the absence of proven and well-designed games, and the cost of developing educational games.[6]

Eukel *et al*. designed and examined a diabetes-themed escape room in an attempt to link educational gaming to pharmacy education. The educational game was designed to enhance the knowledge of diabetes mellitus disease among third-year professional pharmacy students.[7] The impact of the game was measured by students completing pre- and post-tests to examine the knowledge gained. Based on the outcome of the study, the learners showed statistically significant increases in knowledge upon finishing the game. In sum, the diabetes escape room was a useful educational game that enhanced the knowledge of the students on the management of diabetes mellitus.[7]

Another study by Sera and Wheeler presented a synopsis of gamification as well as digital game-based learning. The authors also evaluated the use of digital games in health professional education and provided recommendations for future use in the pharmacy curricula. The study findings showed that there were many areas of the pharmacy curriculum that could be suitable for digital gamification. The study recommended that it is an appropriate time for pharmacy educators to examine how instructional technologies, such as video games and game-based living, can students undertaking a pharmacy program. The authors further recommended that the use of serious games in class could increase the confidence of the learners and enhance the retention of knowledge and skills.[8]

Cain and Piascik also examined whether serious games were a useful strategy for use in pharmacy education. In the course of their discussion, the researchers identified certain benefits of educational gaming in pharmacy. The authors believed that educational games could promote real learning without incurring the risk of consequences to the patient, challenged students of all the levels of performance, promoted collaborative learning, increased the motivation among the learners, provided immediate feedback, and allowed the students to learn from their mistakes without feeling disheartened. However, the researchers also noted that the development of quality games for pharmacy students depended on the expertise of content and proficiency in the science of developing educational games.[9]

Shawaqfeh conducted a systematic review that examined gamification and its use in pharmacy education. The study was motivated by the fact that gamification promotes collaborative learning, which can help learners develop knowledge and interpersonal skills. Besides, there is a common belief that gamification can enhance the confidence and comprehension of the learners. The author obtained past studies from the Embase and Mendeley databases and limited their articles to

those focusing on pharmacy, games, and education. Based on the 11 articles that were analyzed, it was clear that the use of games in healthcare education can enhance the incorporation of knowledge, confidence, and comprehension among the learners. However, some students in the reviewed articles were convinced that the games did not affect their general grades.[10]

Lee *et al.* evaluated the effectiveness of using online educational games to teach cardiac pharmacology to undergraduate pharmacy students. The researchers presented quiz questions developed from the lecture notes to the learners in three independent games. They released every game to the learners at particular times to support the teaching in the classroom. This was followed by a survey that collected feedback from the learners concerning the impact of the games. The findings showed that 19.7% of the students completed the surveys. Most of the learners found the games to be interesting, fun, and engaging. A majority of the students also professed that the games enhanced their understanding of concepts and principles associated with the topic. Specifically, over 90% of the learners suggested that the use of games was an innovative means for them to comprehend the teaching material. In conclusion, the study showed that online educational games that are designed in an appropriate manner motivated and engaged pharmacy students.[11]

Chen *et al.* used an aging simulation game to examine the empathy of pharmacy students for older adults. The researchers recruited first-year students pursuing a course in pharmacy. The changes in empathy were measured before and after the activity with the help of the Kiersma-Chen Empathy Scale (KCES), the Jefferson Scale of Empathy – Health Professions Scale (JSE-HPS), and the Aging Simulation Experience Survey (ASES). Out of the 156 students who participated in the study, it was evident that the KCES and JSE-HPS empathy scores improved noticeably. Among the 13 items used in the ASES instrument, 9 showed significant improvement. The study concluded that simulation games can help pharmacy learners to show empathy and to show a positive attitude towards elderly patients.[12]

Kiersma *et al.* evaluated an educational activity allied to nursing and pharmacy. The learners took part in an interprofessional activity that was designed to enhance empathy towards older adults. Out of the 216 students, 31 suggested that there was need to improve communication, 31 learners found fragmented care to be very frustrating, 37 learners suggested that interprofessional collaboration was necessary, and 17 found the interprofessional experience to be enjoyable. From these findings, it is clear that it is necessary to include extra structured interprofessional activities in all the curriculum of all health professionals. This would put emphasis on collaboration, enhance communication, and change views while planning for interprofessional practice.[13]

Lam *et al.* analyzed the use of virtual games to facilitate interactive learning in a pharmacy program. The researchers introduced virtual games in the classroom and allowed first-year learners to participate. The learners were assigned to teams in a random manner and worked jointly to accomplish the assigned quest games. Upon completion of the experiment, there was a change in the attitude and satisfaction of the learners about the virtual learning experience. The research concluded that the use of virtual gaming technology could promote learning and engagement among student pharmacists.[14]

Another study that examined the effectiveness of an educational game was completed by Trevino *et al.* In this study, optometry students were subjected to an educational board game featuring interactive didactic instruction. Forty-two optometry students took part in the study and were grouped into two GPA-matched groups. The learners were assigned either to 12 hours of the game or 12 hours of lecture. The two groups received the same material from the optometric curriculum. The results showed no noticeable difference in the pre and post-intervention test scores between the game and the lecture groups. Besides, the difference in the score increase was not statistically significant. These findings tended to suggest that educational games were equally effective as interactive didactic instruction in teaching optometry learners. Additionally, each of these two methods of instruction can be entertaining and engaging.[15]

Lambertsen *et al.* used a virtual hospital setting to examine the effect of serious gaming in pharmacy education. "PharmaComm," the game implemented in the study allowed pharmacy students to enhance their skills and knowledge with the health of a virtual patient in a hospital environment. The experiment was implemented in two sections – The first was an experiment where the learners used the application, and the second was in the form of focus groups where the learners discussed their experiences. The findings of the project demonstrated that the use of a serious game could be used to teach pharmacy education. Most students showed a high level of engagement when using the application and argued that the game would help them practice and enhance their skills before applying them in real-life situations.[16]

Jones *et al.* evaluated whether an educational board game would be useful to PharmD students. The researchers focused on the use of educational games to learn the autonomic nervous system (ANS) pharmacology. Twenty-two learners agreed to play the board game, and later undertook an in-class examination featuring 42 ANS questions and eight control questions. The assessment showed that board game participants scored increasingly higher between the pre-, post-test, examination, and the ANSQs. These findings mean that a board game can be used to help PharmD learners to learn ANS pharmacology.[17]

The idea of educational games has also been explored in the study by Chang *et al.* These authors used a cross-sectional approach to examine the gaming aspects of a serious game in pharmacy practice education. The findings showed that the most widespread game reward system was the unlocking mechanisms (22.5%) and experience points (18.1%). A majority of the learners favored fantasy, medieval, or mythic settings (50.9%), while 23.5% preferred modern settings. Most of the lower year undergraduates selected modern settings less compared to upper-year seniors. Generally, the study findings

showed that the use of educational games must strike a balance between real-life and aspects of fantasy.[18]

Bigdeli and Kaufman examined the advantages, disadvantages, as well as factors that influence game engagement in the education of health professionals. The authors searched for related papers from diverse databases and reviewed them. Key advantages of using a game as a teaching tool were associated with cognitive, affective, and psychomotor skills and knowledge acquisition, provision of extra-curricular learning opportunity, and provision of a repetitive learning experience. However, the study also found that the use of games to teach can threaten and intimidate the competitive nature of games for some of the learners, cause embarrassment and anxiety for some of the learners, and the possibility of a mismatch in the style of learning for some of the learners. The authors recommended that the design of games for health professions discipline must consider the advantages, disadvantages, as well as the engagement factors of using this approach.[19]

Lambertsen *et al.* developed a serious "PharmaComm" game and implemented it on student pharmacists in a virtual hospital setting. The authors designed the game to teach communication and drug administration to pharmacy students specifically. Upon evaluation, the game had a positive impact and promoted pharmacy education. However, the authors noted that the current state of the game could only be applied to pharmacy students.[20]

Chang *et al.* examined the experiences, motivations, as well as preferences of gaming among pharmacy students. The authors used an unidentified self-administered survey that collected details on the demographics, gaming experiences, and gaming preferences of the participants. The findings showed that most males relished imagination games compared to females, while females enjoyed simulation games more. Factors that promoted the use of games included progression to the next level, excitement, as well as the feeling of efficacy when playing a game. From the study findings, it was clear that different groups of pharmacy students differ in their experiences of gaming, motivating factors, as well as preferences. Since there is no single size game that fits all, differences in preferences should be considered when developing pharmacy games in order to fulfill the diverse needs of learners.[21]

Mesquita *et al.* used a Brazilian pharmacy faculty to examine the impact of active learning methods of teaching on pharmaceutical care. The pharmaceutical care course was carried out during the first semester of 2014 at the Federal University of Sergipe. One of the active learning methods that were examined in the study involved the use of simulation games. The pre and post-test scores were evaluated and revealed statistically significant improvement for all the competencies that were evaluated concerning competency in pharmaceutical care practice. The findings of the study indicate that the use of active learning strategies can promote the learning of key competencies in pharmaceutical care.[22]

Lucas *et al.* investigated the perceptions of pharmacy students towards an educational game "Party Hat" designed to improve their collaboration and communication skills. The study participants included pre-licensed pharmacy students from a metropolitan university in Australia. 49 learners took part in the game and provided written feedback. Only 15 students took part in the debriefing sessions. Key themes that emerged from the study included the significance of an effective leader. These fundamental biases affect communication and patient outcomes, the impact of words on people, and the significance of respecting the opinion of other people. In sum, the study findings showed that educational games could be used to engage learners and teach them the significance of delivering effective communication. Through educational games, learners can also collaborate with each other.[23]

In another study by Day-Black *et al.* used a dataset of digital nursing students in a community health nursing course to examine the significance of gamification. The game was introduced to the learners through two web-based gamed simulations – "Outbreak at WatersEdge: A Public Health Discovery Game, and EnviroRisk". The findings showed that the use of educational games was effective in supporting learning and enhancing the learning outcomes of the students.[24]

MATERIALS AND METHODS

The objective of the study was to obtain pharmacy students' satisfaction and perception toward educational game implementation in the classroom setting. The experience started by placing fifteen students into two teams and one facilitator who functioned as the host for jeopardy game. The Jeopardy game was designed to cater to the neurology course with a set of 25-questions and bids about identifying types of nerves. The learners were required to identify whether the type of nerves was a cranial or spinal type of reflexes and complete a cranial nerve assessment. The education game lasted for 30 minutes, and students' responses were collected using a Likert scale ranging from "satisfied," "Neutral," and "Unsatisfied." Their impressions and comments on implementing educational games as teaching strategy was also recorded.

SELECTION AND DESCRIPTION OF PARTICIPANTS

To meet the objective of the study, the author followed a prospective study design and selected first-year pharmacy students who were implementing this type of education for the first time in their study. The study was set at a pharmacy college – Princess Nourah bint Abdulrahman University (PNU).

RESULTS AND DISCUSSION

Thirty-students voluntarily participated in the ungraded session of the neurology game, which lasted for 30 minutes. 100% of the learners noted that they were satisfied with the game. The participants identified the key benefits of the educational game as follows: Improved cognition functions like memory and reasoning, promoted mental stimulation, learning was better and faster, improved concentration, recall, and thinking, resulted in motivation and more engagement with the team members, resulted in timed responses that were similar to real-life, promoted immediate scoring and there was

Table 1: Results of the study

Improve cognitive functions like memory and reasoning.
Mental stimulation.
Learning is better and faster.
Improved concentration, recall, and thinking.
Motivation and more engagement with team members.
Timed responses similar to real-life.
Immediate scoring no need to wait for the marking results.
Learning and scoring points in fun environment.

no need to wait for the outcome, and the learning environment was quite fun. Their comments on the experience are shown in Table 1.

The findings obtained from this study are consistent with those of past studies that have shown that educational games have many advantages to the learners. Our findings on improved cognitive functions at least hint to the fact that educational games can cause learners to think quickly on the spot, which is a skill that can help them in their lives. A similar pattern of results was noted in previous studies mentioned before. These findings are very important in understanding how educators can design pharmacy courses to meet the needs of the learners and make them more effective at their duties. One concern about the findings was the fact that the results obtained were limited to the pharmacy college students at PNU and no other students from other similar institutions. Such a lack of depth in the constitution of the sample may hinder the generalizability of these findings.

CONCLUSION

Research on the impact of educational games on learning is increasing and is very promising. Investigations on why games can be a formidable method of encouraging learning are also well-documented. Educational games provide a great opportunity for the scholarship of teaching and learning as pharmacy educators start to embrace this educational strategy. The current study used a dataset of pharmacy college learners from PNU to examine the satisfaction and perception of learners towards an educational game. The findings showed that all the learners were satisfied with the various aspects of the game. Considering these findings, the game can be implemented in the pharmacy program within the institution to promote efficient learning as others previously explored simulated teaching techniques[25-27] in PNU.

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