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CAN GAMIFIED ASSESSMENT REPLACE TRADITIONAL TESTS?

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ABSTRACT

This paper analyzes the potential of gamified tests as a replacement for conventional tests, and the benefits and challenges of the application of gamification in universities and colleges. It looks into the pros and cons of the use of gamification in higher education, reviews the application of gaming elements in assessments and suggests that the incorporation of gamified activities in some of the practical tasks in the classroom helps to develop and nurture the students' practical competences. The article concludes that although the potential of gamified assessment cannot be ignored, the idea that gamification can result in the mastering of the theoretical concepts has not been proven.

Contribution/Originality: This study contributes in the existing literature on the application of serious games in the context of higher education by focusing on assessment. It is one of very few studies which looks into the possibility of replacing traditional assessment tools with game-based tests.

1. INTRODUCTION

Universities and colleges have been having a hard time keeping the concentration and motivation of students in lecture rooms. Many students involve themselves in many things during the lecture other than learning. For this reason, many institutions of higher learning are searching for ways of improving students' motivation and engagement. Gamification, which is the application of game elements to learning, is revolutionizing education (Domínguez *et al.*, 2013). In particular, gamified assessments have become a significant topic as professors and teachers look for ways of implementing game-like assessment in their courses to replace traditional tests. However, its application in higher education is still a topic of contention (Darling-Hammond, 2010). This paper analyzes the potential of gamified tests as a replacement for conventional tests, and the benefits and challenges of the application of gamification in universities and colleges.

2. GAMIFICATION IN HIGHER EDUCATION

2.1. The Pros and Cons of the Use of Gamification in Higher Education

For educators in institutions of higher learning, implementation of gamification can only be realizable if the current teaching methods are restructured, and the concept is holistically incorporated into the institution's curriculum. However, this poses its own problems since students can be frustrated and confused if game mechanics

are affixed to pre-existing lesson plans in a slapdash manner. The latter may further increase the complexity of simple processes. Great strides have been made in the lecture room environment by modeling tests into a role-playing game. According to research conducted by Dr. Lee Sheldon in 2009, modeling a course or test into a game can result in the improvement of students' grades and improve their engagement levels (Koivisto and Hamari, 2014). In his experiment, Sheldon utilized a multiplayer online game where students took part in the quests, developed guilds with classmates and created avatars. Additionally, he restructured the course in such a way that the students could decide the order in which they could tackle the tasks in the gamified assessment. The measurement model provided needed students to reach the twelfth level to score an A. Sheldon's application of gamification in education was successful and has provided a path that has been taken by many Universities. Gamification increased the average grade of students from a C grade to B and substantially increased attendance records (Smith-Robbins, 2011). Engaging over one hundred students in a lecture room can often be a daunting task. At the University of Michigan, Professor Cliff Lampe incorporates gamification into his lessons to increase the students' motivation and engagement thereby making it easier for him to manage a large number of students. In almost all institutions of higher learning, the number of students attending lectures is usually high. According to Lampe, it is possible to attend to all students by implementing groups, giving students' freedom of choice, and using a monitoring system to provide immediate feedback by using "game labels." The professor's tactics have increased his students' retention of the theoretical and practical content, which explains why many of his peers have grown receptive to his methods of teaching (Koivisto and Hamari, 2014). Introducing games that touch on sensitive issues such as racism and slavery to the college classroom can be a challenge (Hand, 2017). For instance, a gamified test that attempts to determine the students' grasp of history based on the fight for freedom of slaves in the US can result in troubling implications. In a certain game, the decisions made by the player determine his/her position in society. However, the sequence of actions that may lead one to be a slave within the confines of the game implies that slavery is a choice. This revelation may be offensive especially to the African American community. Therefore, the tests will not be taken by many students who are offended by that depiction of slavery. In another instance, a black character may be depicted in a shootout with law enforcement officers implying that majority of the African American community are criminals. Therefore, it is crucial for the developers of the game-like tests to balance all the aspects of society. This can be rather challenging as it is easy to forget some issues that may turn out to be offensive to a section of the community. When that happens, the goal of the gamified assessment will not be achieved.

2.2. The Application of Gaming Elements in Assessments

According to surveys conducted in universities on the impact of gaming elements on the motivation and engagement of students, it was determined that elements such as badges and experience points (XPs) had positive effects on students (Glover, 2013). These elements are usually awarded to students after completing the missions, tasks or quests in the gamified tests. These awards motivate students to do more to earn more badges or points. Additionally, the students have a regular report of their progress in the course as the system offers immediate feedback on the students' performance. However, some game elements such as time tracking, competition, and avatars have poor impacts on the students' motivation (Blohm and Leimeister, 2013). For instance use of avatars does not result in any behavior change in students as participants had a common opinion that although designing avatars was entertaining and fun, it was distracting, embarrassing and even silly (Blohm and Leimeister, 2013). Time track elements impose unnecessary pressure on students particularly when they perform badly because they could not finish the tasks in time. Although time is an important aspect in all assessments and is a crucial part of traditional tests, in gaming environments, insufficient time interferes with the students' completion of the tasks and this results in creating a disparity in the measurement model. Gamification elements, such as leaderboards and scorecards, have proven to have created a sense of competition among students, which raises their motivation. The

competitive nature of such individuals is raised and this forces them to work extra hard to surpass other students (De-Marcos *et al.*, 2014). However, research shows that many college and university students do not like it when their results are displayed for everyone to see, and this may affect their willingness to take part in such evaluations. Some students may be uncomfortable when their scores are open to everyone and this might affect the learning process. Additionally, some students do not like to compete, and the inclusion of such game elements could adversely affect their learning process as well (De-Marcos *et al.*, 2014). According to a survey conducted in various universities in the US, some students had reservations on the application of scorecards and leaderboards. One student quoted that: "I prefer traditional activities because I don't think that leaderboards are a good representation of who gets more knowledge about the course" (Domínguez *et al.*, 2013). Therefore, professors should consider the types of gaming elements they introduce into a college classroom.

2.3. Examples of Application of Gaming Elements in Institutions of Higher Learning

A course in the university called research methods can be represented as a subject with eight gaming elements. Avatars are used to choose a nickname that correlates with the class. Each person generates a particular amount of Experience points that depend on the students on the scoreboard. The levels represent grades that rely on Experience points. As the course progresses, competition and cooperation between individuals or groups are measured. Later, feedback is presented orally after completion of the tasks. The whole process is usually carried out through an online learning platform. In this scenario, all gaming elements except avatars are easily implemented (Deterding *et al.*, 2011). In another example, tools that enable students to share, moderate and create a repository of course questions and answers in an online platform are used by some universities (Kosmadoudi *et al.*, 2013). In this scenario, students design their questions on the topic, provide possible answers, rate submissions made by their classmates and take part in online discussions. The learning environment is turned into a gaming environment where labels are given to participants. For instance, the lecturer is called the game master; the students are the players while the assignments and grades are called missions and levels respectively (Deterding *et al.*, 2011). The principle of including game tactics in lessons is similar to all gamification platforms.

2.4. The Potential of Gamification as an Assessment Tool

Assessment that incorporates gamification creates an opportunity for advancing formative evaluation in higher education. The technique has the potential of producing significant information that is useful to a variety of stakeholders in colleges and universities such as lecturers, school's administration, parents and students. The method can only be useful in assessing students if the game –based applications are appropriately designed (Domínguez *et al.*, 2013). The primary obstacle is in the creation of immersive gaming scenarios that are suitable for evaluating students while maintaining the quality considerations that include validity, fairness, and reliability. Various possibilities can be taken into account in determining the potential of replacing traditional test with the game-based assessment. In the context of replacing traditional test with game-based tests, it is crucial for the developed systems to ensure that the educational games are reliable, valid and practically invisible, which refers to keeping the engagement logical and relevant. As the assessment is administered, the goal is to measure the students' sequence of actions as they perform the complex task in the game. The students' execution of the tasks in the game depends on the acquired skills and abilities obtained in the classroom. Each task measures the knowledge acquired in a given subject or course. The measurement model embedded in the game evaluates the students' performance and produces an instant feedback which can be in the form of a report (Shute, 2008). Skills such as problem-solving and scientific research skills can be measured. The interaction between the game - running applications or processes- and the university or college student provides the elements that are needed in the assessment of the student's skills which is usually different from the results or product of a particular game based activity. The end products are in line with the standards of a learning environment. For instance, the student may

perform a mathematical task in the form of a game that depicts a real-life determination of the time taken to reach a destination by car. Usually, the games are in the form of quests where the player gets rewards such as badges for achieving certain levels in the gamified tests. The player has to make a sequence of actions or decisions in the quest as the game-like test progresses. The decisions or actions made by the student offer periodic evidence of the knowledge of a particular skill, fact or concept. Therefore, the evaluations in the test can be used to find out what the students know or do not know at any given time. For instance, a short evaluation of discretion can be incorporated into a game atmosphere where the dynamic data of the assessed individual can be used as a basis for formative feedback and diagnosis (Delacruz, 2011).

2.5. Opportunities

Tutorials are an excellent tool for eliminating lack of familiarization with the controls used in navigating through the game –based assessment software. However, one should not forget that students' motivation and influence can adversely be affected if the navigation tools are difficult to understand. Fortunately, nowadays, tutorials are embedded in every software including those used in assessing the students' performance. Additionally, college and university students of the 21st century were born in the age of computer and can easily understand the navigation controls of the developed software. Another important aspect to consider is the amount and type of feedback generated by the assessment tool. As the students interact with the system, the measurement methods used should consider the kind of feedback provided to these students when analyzing the gathered data. The feedback from the gamified assessment is faster and more reliable, unlike traditional tests which take time to determine the results (Shute, 2008). In an assessment setting, the student may decide to make many attempts and revisions before deciding on the possible decision or choice to make. The measurement methods can be modeled to handle all the re-plays and attempts before making the final score of the assessed individual.

3. CHALLENGES

3.1. Interaction Issues

Developing the appropriate environment for interaction between the student and the gamified assessment system can be a daunting task. The nature of interaction established by the game-based assessment may not match the expectations that students have on any assessment task (Domínguez et al., 2013). The traditional test might have an environment that is different from the software-based assessment. Some of the gamification assessment systems may be illogical to the student. Therefore, it requires a comprehensive capturing of behaviors that can be utilized as evidence while restricting other behavior types without the assessment system being repetitive or dull. However, achieving this objective can be an uphill task.

3.2. The Demands on the Students Working Memory

Game-based assessment tools can have high demands on the students' working memory. For instance, a game that has been designed with higher levels of engagement and interactivity can lead to an increase in the students' demands on his cognitive processing which may result in the reduction of the system's measurement quality (Kim and Park, 2009).

3.3. Accessibility Issues and the Inclusion of Construct-Irrelevant Skills and Content

The advancement of technology has led to the development of hardware devices that can handle rich and immersive graphical environments which may pose a problem to the student's grasp of the assessment elements due to the high demand on their auditory, visual and motor abilities. The high demands on the three aspects of a student's body can be a hindrance to the successful interaction of the assessed individual and the game-based assessment tool (Zapata-Rivera and Bauer, 2012). Therefore, the student may find it difficult to access the

assessment system. Sometimes the developers may include interactions and content that impose requirements on skills and knowledge that are not part of the course materials.

3.4. The Influence of Feedback When Comparing Traditional and Gamified Assessment

Feedback is an important aspect of any assessment or test as it determines where the student has acquired the knowledge and skills taught on the subject. According to Shute and Ke (2012) feedback on formative assessments is extremely important, and the improvement of skills and knowledge acquisition depends on the feedback provided in educational environments (pp. 45-48). Apart from influencing achievement in the classroom, feedback is recognized as a crucial factor in motivating all types of students (Delacruz, 2011). Zapata-Rivera and Bauer (2012) argues that instant or immediate feedback can prove to be useful in gamification as the information provided by the game-like test can be used to direct the refinement or exploitation of interactive strategies employed in the gamified assessment. The quality and reliability of the evidence offered by the assessment depend on the feedback (pp. 147-169).

Gamified systems to be used in educational settings must have feedback which helps to monitor the student performing the various tasks or quests designed into the system. One of the challenges of traditional tests is that it is usually slow (Shute and Ke, 2012). For instance, most evaluations may come at the end of the month or the end of the year. Reports of the test done are not immediate, and students have to wait for a long time before knowing their progress. Sometimes the evaluations may be too late to call for an intervention. Most universities have the end of semester exams which are usually evaluated at the end of the year to determine the students' progress. These traditional assessments take a long time to analyze and prepare, unlike the gamified assessments which are instantly processed by the computer to produce immediate results. Therefore, students will be able to determine their progress at an early state and interventions can be made to correct any challenges they may have with their studies.

The advantages of the application of gamified assessment in higher levels of education are that the incorporation of the gaming world in the lecture rooms eliminates the time taken while waiting for the results of the test to know how the student did the task (Zapata-Rivera and Bauer, 2012). Short-term tests such as daily assignments may take a full day or even two days before the lecturer takes time to mark the papers. However, with gamification, each player's or student's actions will be relayed to the lecture immediately. Additionally, the feedback may be in the form of textual, bars, points, trophies medals and verbal thereby offering a broad analysis of the progress. The integration of gamification in newly established rating models is expected to occur in future institutions of higher learning. In fact, some universities such as the University of Michigan have started incorporating this features in their education systems (Hand, 2017). The truth is that although many schools are reluctant to employ gamification in their learning process, the potential for its growth cannot be ignored.

4. CONCLUSION

For the successful implementation of the gamified tests in institutions of higher learning, the assessment should be provided linearly as the learning process is linear. Therefore, the developed game-like assessments should be designed in such a way that students cannot access the next step or quest in the assessment before completing the current ones. It is evident from the article that the incorporation of gamified activities in some of the practical tasks in the classroom helps to develop and nurture the students' practical competences. On the other hand, the idea that gamification can result in the mastering of the theoretical concepts has not been proven. The potential of gamified assessment cannot be ignored especially with the advancement of technology which has enabled the creation of game-like assessments that create a realistic interactive environment. According to a survey done on their application in university and college settings, many students have shown a lot of motivation and engagement especially due to gaming elements such as; feedback, badges, experience points and leaderboards (Blohm and

Leimeister, 2013). More research including case studies is necessary before we can definitively assert that gamified assessment can replace traditional tests, but findings to date show that it is surely possible.

REFERENCES

Blohm, I. and J.M. Leimeister, 2013. Design of IT-based enhancing services for motivational support and behavioral change. Business and Information Systems Engineering, 5(4): 275-278. *View at Google Scholar | View at Publisher*

Darling-Hammond, L., 2010. Teacher education and the American future. Journal of Teacher Education, 61(1-2): 35-47. *View at Google Scholar | View at Publisher*

De-Marcos, L., A. Dominguez, J. Saenz-de-Navarrete and C. Pages, 2014. An empirical study comparing gamification and social networking on E-learning. Computers and Education, 75: 82-91. *View at Google Scholar | View at Publisher*

Delacruz, G.C. (2011). Games as formative assessment environments: Examining the impact of explanations of scoring and incentives on math learning, game performance, and help seeking. (CRESST Report 796). Los Angeles, CA: University of California, National Center for Research on Evaluation, Standards, and Student Testing (CRESST).

Deterding, S., D. Dixon, R. Khaled and L. Nacke, 2011. From game design elements to gamefulness: Definng gamification. Proceedings of the 15th International Academic MindTrek Conference: Envisioning future m. ACM. pp: 9-15.

Domínguez, A., L. Saenz-de-Navarrete, L. De-Marcos, C. Fernández-San, J. Pagés and Martínez-Herráiz, 2013. Gamifying learning experinces: Practical implications and outcomes. Computer and Education, 63: 380-392. *View at Google Scholar | View at Publisher*

Glover, I., 2013. Play as you learn: Gamification as a echnique for motivating learners. World Conference on Educational Multimedia, Hypermedia and Telecommunications, AACE. Chesapeake,VA. pp: 1999-2008.

Hand, B., 2017. Designing successful gamification practices in higher education. Retrieved from www.gettingsmart.com/2016/12/gamification-practices-and-failures-higher-education/amp.

Kim, B. and Y. Park, 2009. Not just fun, but serious strategies: Using meta-cognitive strategies in game-based learning. Computers & Education, 52(4): 800-810.

Koivisto, J. and J. Hamari, 2014. Demographic differences in perceived benefits from gamification. Computers in Human Behavior, 35(1): 179-188. *View at Google Scholar | View at Publisher*

Kosmadoudi, Z., J. Lim, S. Ritchie, Y. Louchart, R. Liu and Sung, 2013. Engineering design using game-enhanced CAD: The potential to augment the user experience with game elements. Computer -Aided-Design, 45(3): 777-795. *View at Google Scholar | View at Publisher*

Shute, V. and F. Ke, 2012. Assessment in game-based learning: Foundations, innovations, and perspectives. New York: Springer Science + Business Media.

Shute, V.J., 2008. Focus on formative feedback. Review of Educational Research, 78(1): 153-189. *View at Google Scholar | View at Publisher*

Smith-Robbins, S., 2011. This game sucks: How to improve the gamification of education. Educause Review, 46(1): 58-59. *View at Google Scholar*

Zapata-Rivera, D. and M. Bauer, 2012. Exploring the role of games in educational assessemt. In M. C. Mayrath, D. Clark-MIdura, Robinson, & G. Schraw, Technology-based assessments for twenty-first-century skills: Theoretical and practical implications from modern research. Charlotte, NC: Information Age Publishing. pp: 147-169.