Analysis of the Data & Findings

Steven Wong

New Jersey City University

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Introduction

The research study on gamification and game-based learning (GBL) continues to grow in the repository. Here is a review of the five selected peer-reviewed journals highlighting gamification and GBL, adding to the research contribution. There were differences in classroom learning setup between gamification and GBL. Gamification is the process of the use of the game design in non-game settings to facilitate engagement among participants. Also, gamification alters the learning experience structure; the instructor breaks from its norms of lectures and gamifies the classroom for a new experience (Hanus & Fox, 2015). However, GBL offers flexibility and adjusting the traditional classroom, interchanging a learning activity, without altering the overall structure of the classroom. The following is a review of the selected scholar journals with a focus on the analysis of the data and findings on gamification and GBL, including research questions, type of research method and design, the data analysis techniques and procedures, and the conclusions concluded for each research study.

The Effectiveness of Gamification Technique for Higher Education Students Engagement

The researcher finds out if educators will adopt the gamification in their lesson plans from students' acceptance and the increase of the engagement level. Hypotheses include perceived ease of use and perceived usefulness to their learning as positive influence for student's acceptance to gamification (Rahman, Ahmad, & Hashim, 2018). The study involved an empirical investigation through an exploratory analysis, including 50 students who were from Muadzam Shah Pahang, a Malaysia university undertaking a database design course (Rahman, & et al., 2018). Kahoot and Quizizz were part of the data collection and procedure, and student engagement measured through Gamification Acceptance Model (GAM), a survey instrument

based off of Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989) and Student Course Engagement Questionnaire (Handelsman, Briggs, Sullivan, & Towler, 2005) through a 5-point Likert scale option (Rahman, & et al., 2018).

The study employs a descriptive statistic to describe means, correlations, and standard deviations to analyze the measurements of students' engagement after the use of gamification technology. "The reliability of the GAM tested through the use of SPSS 20, with Cronbach's alpha scoring values above 0.7 for all constructs, an indication that the instrument used is reliable and acceptable" (Rahman & et al., 2018, p. 11). The assessment of perceived usefulness shows a standard curve data distribution as the value of mean near the low value of standard deviation (SD); respondents agree to the convenience of the gamification tool. Also, "the data for perceived ease of use shows the normal standard distribution, with a low value of 0.64397 for SD, indicating clustering of data near the mean value, and the respondents agree on the ease of use of the gamification technology" (Rahman, & et al., 2018, p. 12). Furthermore, "the engagement level analysis was following a normal standard curve data distribution, with a low SD of 0.55733, depicting that the data not widely spread from the mean value indicating data reliability" (Rahman, & et al., 2018, p. 13).

In conclusion, perceived ease of use is a better indicator of a student's attitude towards the use of gamification technology. Also, this study found the use of Kahoot and Quizizz to enhance student engagement in the classroom.

Use of Digital Game-Based Learning and Gamification in Secondary School Science

There is a lack of study on curriculum integration to achieve instructional objectives. The research questions for this study focused on the inclusion of GBL in the curriculum as an effective way of transferring knowledge, turning passive learners into active learning. The

alternative hypothesis is that the GBL integration did not have a positive influence. Also, analyzing the relationship between gender and learning outcomes. Digital game learning activities designed to promote engagement and learning through students of secondary school science. The research design is a non-equivalent quasi-experimental design with a focus on quantitative, and with a few qualitative aspects. “Convenience sampling done through a selection of 72 eight grade students ranging from12 to 15, drawn from a private suburban area school located in Islamabad, Pakistan” (Khan, Farzana, & Malik, 2017, p. 2774). Participants assigned randomly both to the treatment group and control group. Data collection involves quantitative methods for the classroom observations, including pre and post-tests, to statistically analyze and compare means (Khan & et al., 2017). Also, a qualitative method such as a focus group to gather information on the effectiveness of the GBL application.

“The analysis is to understand the engagement level of students and to investigate the impact of the developed GBL on student achievement and gender difference; comparisons draw at 95% confidence interval” (Khan & et al., 2017, p. 2779). “The student engagement data observations skewed for treatment and control groups; the researcher employed a Friedman test, a non-parametric test similar to a one-way ANOVA with repeated measures applied within treatment groups. Also, the Mann-Whitney U test similar to Independent Samples t-test applied between control and treatment groups” (Khan & et al., 2017, p. 2779).

In conclusion, the main finding is that the GBL application “patterns of reactivity” positively influenced the student’s emotional and behavioral engagement in the science classroom. Also, the GBL application has a positive impact on learner’s participation but fell short of achieving learning outcomes. Furthermore, there were different results among the

genders; girls have a significant gain in learning outcome and engagement level compared to boys.

Technology-Enhanced Learning in Sports Education Using Clickers

The research of technology in the field of sports education is limited. This empirical investigation study contributes to the approach of using technology-enhancement in sports education. This study involves a mixed-method approach, where quantitative data collected on athletes' performances and attitudes and qualitative data from a focus group with the trainers.

The study involves the examination of clicker use of 162 Judo athletes of a Judo Academy in Cyprus to improve the effectiveness of Judo seminars on the rules and regulations of the sport (Constantinou & Ioannou, 2016). The research design is a mixed method that involves the within-subject quasi-experimental quantitative design and the use of focus groups for the qualitative research method. The researcher uses within-subject design to allow for the study of each participant in both treatments, in this case, clickers and paper-and-pencil, and enable the researcher to note the difference found attributed to the treatment results instead of the participant's characteristics. The studied participants split into six cohorts, after all, seminars, a one-hour semi-structured focus group interview with the two trainers (Constantinou & Ioannou, 2016).

All participants were first time users of clickers. The participants came through convenience sampling ranging from the age of between 7 and 50 years old (Constantinou & Ioannou, 2016). Each cohort received similar instructional video-snapshot materials for the training of Judo athletes sourced from the International Judo competitions. A five type multiple-choice responses designed for each video; each possible answer choice involves a decision that a Judo coach could have made. Each seminar devoted 15 answered with clickers, and 15

responded through using paper-pencil for a total of 30 video-snapshots, with a 5 min break between conditions (Constantinou & Ioannou, 2016). Respondents had 10 seconds per video and only allowed one recorded response to simulate the environment for fast reaction time and decision-making skills needed during the Judo battle. However, the functionality for the paper-pencil format was different, advising the respondents to note not to change the answer once marked and the answer sheet collected after the 10 seconds. For each question, the trainer presented a histogram of total responses and provided the right solution, trainers provided feedback depending on the generated responses. After answering the 30 questions, each participant participated in a short questionnaire involving an eight Likert-type style, questions addressing the experience with clickers, and paper-and-pencil. After the six seminars, followed by a semi-structured focus group interview with the two trainers that were part of the study to find out what happened in the research site and what was the value of the clickers from the trainer's perspective.

The quantitative data analysis reveals a statistically significant difference in athlete's scores on all items of the questionnaire in favor of the clickers condition. "The effect size for the mean attitude score difference was large, based on Cohen's (1988) guidelines, d = .8 for large effect" (Constantinou & Ioannou, 2016, p. 74). Also, smaller SD for the items about clickers, suggesting how participants were in more agreement with one another about their clickers experience compared to paper-and-pencil experience. Besides, "there was a significant difference in athlete's performance [$t(161) = 2.36$, $p=.019$]" (Constantinou & Ioannou, 2016, p. 74), with athlete's finding more correct answers when they used clickers compared to paper-and-pencil. Furthermore, "Pearson's correlation between attitude and performance showed a non-statistically

significant correlation. Therefore a link between positive attitudes and performance in the clickers condition cannot be considered" (Constantinou & Ioannou, 2016, p. 74).

For the qualitative analysis, the focus group interview coded through an iterative coding approach for a total of 29 thematic codes identified until saturation reached, later classified into three broader themes associated with the use of clickers for the training seminars (Constantinou & Ioannou, 2016, p. 75).

In conclusion, finding recommendations suggest that the use of clickers has a connection to the athlete's better performance because of the improved feedback communication between athletes and trainers. The use of clickers during a Judo battle improves the reaction time and decision making. Overall, the results suggest a comparative advantage of clicker-enhanced Judo seminars over the conventional method of paper and pencil about athlete's performance, attitudes, and response to the fast-paced nature of Judo coaching.

Gamification in Entrepreneurship and Accounting Education

The objective of this journal piece is to investigate how entrepreneurship and accounting skills delivered through gamification. A mixed-method research approach involving both quantitative and qualitative data analyzed; the experimental method conducted through an educational board game with a class of 49 non-accounting students. "Data collection included questionnaire surveys given before and after the experiment to acquire feedback on the gamification approach, a reliability analysis performed on the instrument's item shows the Cronbach's alpha value of more than 0.70, indicating items were reliable to measure the skills" (Rosli, Khairudin, & Saat, 2019, p.3). Besides, followed by an interview on students' reflections regarding their experience and perceptions in using the gamification approach. Qualitative

interview data coded using thematic analysis revealed two themes that emerged from the students' reflections (Patton, 2002).

"Descriptive analysis performed to understand the demographic of the participants. The independent sample t-test analysis identifies the differences between critical thinking and problem-solving skills before and after the game" (Rosli & et al., 2019, pp. 3). "T-test result shows significant differences (p=0.000) between the scores before the game and the scores after the game for critical thinking and problem-solving skills" (Rosli & et al., 2019, pp. 4). Also, the mean score for critical thinking and problem-solving skills had increased after playing the game. As well, "findings show Levene's test for equality of variance was not significant, indicating equal variance not violated" (Rosli & et al., 2019, pp. 3). Furthermore, participants agreed with the use of a board game to assist them with understanding business accounting.

In conclusion, finding recommendations includes educators applying educational games into their instructions to facilitate active learning and to provide a channel to experience business activities as an entrepreneur (Rosli & et al., 2019). Also, student's reflection revealed that incorporating business transaction through educational games motivate students to engage in entrepreneurship learning (Rosli & et al., 2019).

Linking Early Childhood Education with Indigenous Education Using Gamification

Many Nigeria children cannot speak their native dialect or even understand the indigenous verbal and non-verbal expressions. This journal examines the linkage of early childhood education in Nigeria with indigenous education format using gamification to maintain cultural value and identity in Rivers State. Four research questions presented and utilize the use of descriptive survey design (Ukala & Agabi, 2017). "The use of stratified random sampling to acquire 164 headteachers of early childhood centers from 655 public primary schools across the

23 local governments of Rivers State" (Ukala & Agabi, 2017, p.21). "A self-designed 41 items instrument titled Linking Early Childhood Education with Indigenous Education using Gamification Questionnaire based on a four-point Likert type scale." ((Ukala & Agabi, 2017, p.21). The instrument reliability test went through Cronbach's alpha method, yielding a coefficient of 0.81, indicating a reliable instrument (Ukala & Agabi, 2017).

The researcher analyzed various research questions by using mean and rank order statistics. Findings revealed that the early childhood curriculum in Rivers State is not in harmony with indigenous early childhood education stipulated by the Nigerian Policy on Education (Ukala & Agabi, 2017). Also, findings detailed that teachers are aware of ways to use gamification for indigenous education, including storytelling, riddles, and demonstration, however, do not use the methods because not highlighted in their work manual (Ukala & Agabi, 2017). Also, proper training needed to assist the linkage of indigenous education using gamification in early childhood education in Rivers State (Ukala & Agabi, 2017).

Conclusion

Different research methods employed to answer the posed research questions from the reviewed five peer journal articles. Quantitative data collection and analysis involved inferential statistics, including correlations, independent sample t-test, and Friedman test, comparable to a one-way ANOVA. Qualitative data collection went through interviews and focus group involving coding via thematic analysis to find emergent themes. A few studies, including Rosli, Khairudin, & Saat (2019) and Constantinou & Ioannou (2016), involved mixed methods, which include both the quantitative and qualitative analysis. A common theme was the use of Likert type scale for survey questionnaires and the use of Cronbach's alpha method to test out the reliability of items on the instruments. Besides, different types of random sampling strategy

techniques, including convenience sampling and stratified sampling, utilized among the studies to acquire the participants. Overall, the appropriate research method and design used to answer the presented research questions and provided recommendations for the findings.

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