The Use of Gamification Tools to Boost Students' Engagement and Motivation

Renée Hannah A. Niro, Via Shereen L. Daracan, Arvin Joseph D. Pizarro, and Josephine D. German
School of Industrial Engineering and Engineering Management
Mapúa University
685 Muralla St., Intramuros, Manila 1002, Philippines
rhannah.niro@hotmail.com, viadaracan@gmail.com, arvinpizarro@gmail.com, jdgerman@mapua.edu.ph

Abstract

Gamification tools are integrated into learning management systems (LMS) as an instrument to help increase students' motivation and engagement in class. These tools include badges, rewards, achievements, leaderboards, and others. This study used the mixed methods of research to determine the appropriate gamification tools for selected Industrial Engineering (IE) courses in a higher education institution (HEI) and determined students' acceptance of the use of these tools. Literatures indicated that Achievements and Rewards tools could be utilized in all of the courses. Similarly, the Technology Acceptance Model (TAM) results showed that gamification tools generated positive responses because of their usefulness and ease of use. However, students lack the intent to use the gamification tools. For the students to use the gamification tools, they need to exhibit a confident attitude in using them. This study's findings could be used as a basis for designing and evaluating the gamification tools available in various LMS.

Keywords

Technology Accepted Model (TAM), gamification tools, Learning Management System (LMS), learning objectives

1. Introduction

Cognitive ergonomics has played an enormous role in numerous fields such as healthcare (Holden et al. 2020), medicine (Khan et al. 2020), human-machine operations (Kim et al. 2021), and sports (Hulme et al. 2019). In education, utilizing cognitive ergonomics has been proven to help determine factors that dramatically affect one's learning process, like enjoyment and boredom (Obergriesser and Stoeger, 2020), the presence of the teachers (Lim and Richardson, 2021), and working memory capacity (Uus et al. 2020). Results generated in these studies are specifically valid on self-learning and online class setups.

With the growing interest in information and communication technology and the demand for online learning, learning management systems (LMS) are also rising. LMS provides online learning services (Aldiab et al. 2019) from various external sources to local schools and universities. Some notable LMS widely used today are Blackboard, Moodle, and Canvas (Aldiab et al. 2019b). However, several problems arise in using LMS, like how lecturers and facilitators are having difficulty retrieving accurate information (Saroha and Mehta, 2016). According to a survey conducted by Ariffin et al. (2015), factors like technology competency, accessibility, teacher's initiative, and student's perceived usefulness affect how these users utilized the LMS. To encourage and invite students to use LMS platforms, researchers study the effects of implementing different techniques such as gamification.

The incorporation of game features and elements has been in the works in different research fields and the design of gamification systems is proven to provide positive results. Gamification systems have boost physicians' engagement with their patients through online healthcare platforms (Liu et al. 2020), have been a useful tool that boosts corporate workers' enjoyment and productivity (S. Kim, 2020), and has held a strong influence in inciting consumers' impulsive buying (Zhang et al. 2020).

This study determined the students' acceptance and perceptions in using gamification tools to enhance their engagement and motivation under a fully online learning setup. It also provided an insight on the proper gamification tools for specific courses that will enhance the students' cognitive learning process. Specifically, the study considered the use of Blackboard LMS of a higher education institution (HEI) in the Philippines for IE courses.

2. Literature Review

Abu-Dawood (2016) reviewed multiple empirical studies regarding gamified e-learning environments' effects on the students' psychological and behavioral outcomes. The previous studies mostly supported the ideas under the positive impact of gamification. The different tools and elements of games positively promote different factors that enhance the students' cognitive engagement and social interaction with their peers. Immersive storylines, motivational badges, virtual agents, and leaderboards improve specific cognitive and social motivational affordances. The results of the quasi-experimental study by Li et al. (2020) demonstrated the importance of the design of instructor's feedback content and delivery in an online learning environment. The lack of game elements and options in the delivery methods (video, text, or both) provided conflicting and inconclusive results. Students were not only less motivated and had a lowered sense of community when provided with both video and text format of feedback, yet still failed to determine which of the three delivery methods was the most effective in promoting student participation. Furthermore, it failed to consider the appropriate feedback tools for different course content and individual preferences.

Legaki et al. (2020) explored the gamification of statistics education and developed a challenge-based web application called *Horses for Courses*. To their credit, they considered the students' preferences and the application of appropriate tools to a specific course. However, it does not state any lasting impression. There is no indication that the application is designed to satisfy principles under cognitive ergonomics despite four years of data collection on retaining students' focus, learning, memory, and motivation.

Although some literature is available on gamified learning in the sciences and math (Jácome-Amores et al. 2021), there is little information on the students' preference acceptance on implementing such gamification tools. Many studies that are available heavily focus on the gamification of e-learning. (Ariffin et al. 2015, Bovermann and Bastiaens 2020, Li et al. 2020, Lim and Richardson 2021, Zainuddin et al. 2020). However, there is still a lack of significant academic research that addresses Philippine online education's status in its effectiveness in enhancing the cognitive learning process. Given the abrupt shift of traditional face-to-face classes to other modes of distance learning (modular, blended, or fully online) due to the COVID-19 pandemic, existing studies have topics ranging from the reviews on policies and strategies (Tria, 2020), assessments on the alternative learning modes utilized compared to other countries (Joaquin et al. 2020), status reports on a specific region (Reyes-Chua et al. 2020), barriers to learning for a specific field of study (Baticulon et al. n.d.), and others. Studies regarding the evaluation of LMS or other online learning platforms utilized by educational institutions and universities in the Philippines through the lens of cognitive ergonomics have yet to be thoroughly discussed.

3. Materials and Methods

This study was divided into three parts. Parts 1 and 2 were about using qualitative methods (e.g., observation and evaluation) on the present gamification tools in Blackboard LMS that followed design principles through the lens of cognitive ergonomics. In the design for the gamification tools, the study followed the three keys to engagement, motivation, and well-being, as discussed by Peters et al. (2018). For Part 3, where the students' acceptance of the tools were determined, it utilized quantitative methods to gather relevant information and analyzed those data using statistical analyses.

Figure 1 illustrates the methodology of this study, which followed the mixed methods approach. The study's qualitative method used a literature review to present the various gamification tools for education and the tools available in the Blackboard LMS. The taxonomy of learning or educational objectives was reviewed to assess the hierarchy of each IE course's learning objectives included in this study and was used to determine which among the courses are fit to utilize specific gamification elements.

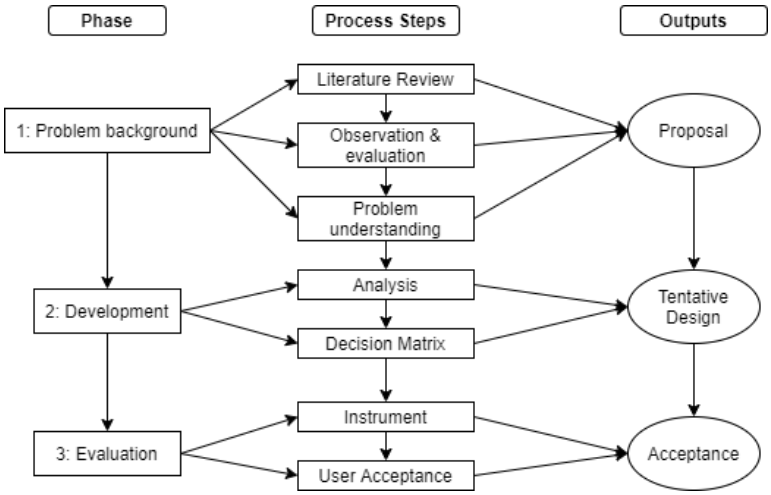

Figure 1. Research Methodology

Figure 2 showed the basis for the evaluation of the present gamification tools in Blackboard LMS. The theory posited that the design features (independent variables) were caused by three common factors (dependent variables): well-being, motivation, and engagement measures. The evaluation of the present gamification tools also utilized principles under cognitive ergonomics. A decision matrix was constructed for the gamification elements and Bloom's Taxonomy of Educational Objectives. Another matrix was created to serve as the basis and criteria in determining which IE courses were fit for each type of gamification tool. The criteria matrix was designed to pair up the gamification elements and check if the element would satisfy all levels in Bloom's Taxonomy of Learning Objectives.

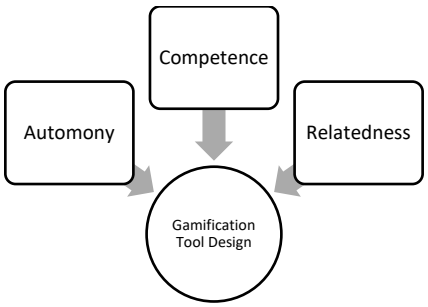

Figure 2. Conceptual Framework of Design Variables

The last part of the survey instrument was constructed using the Technology Acceptance Model (TAM), loosely based on the final version of TAM formed by Venkatesh and Davis (1996) and mostly on the research framework utilized by Weng et al. (2018). The questions were categorized by “perceived usefulness”, “perceived ease of use”, “attitude toward using”, and “intention to use”. It was constructed not only based on the students' likelihood of using the tools and the degree of its expected effortlessness but also on how it would boost the students' engagement and motivation.

The data gathered from the (1) demographic profile, (2) gaming experience, and (3) awareness of present gamification tools were analyzed using descriptive statistics. The data gathered from the user acceptance part of the survey were interpreted using Statistica software. The internal consistency of the scale used in the proposed survey instrument was determined using the Item Analysis. The hypotheses presented in Table 1 were tested using separate regression analyses to explain the students' acceptance of the gamification tools.

Table 1. Hypotheses of the Study

Hypothesis	Relationship tested
H1	Perceived Ease of Use has a significant effect on the Perceived Usefulness of the gamification tools.
H2	Perceived Ease of Use and Perceived Usefulness has a significant effect on the students' Attitude Towards Using the gamification tools.
H3	Perceived Usefulness and Attitude Towards Using has a significant effect on the students' Intention to Use the gamification tools.

Data was gathered by disseminating an online survey questionnaire using Google Forms to 50 respondents to determine the students' perception and acceptance of the gamification tools. The respondents were 2nd and 3rd-year level IE students of the HEI who were currently enrolled and using the LMS during the period of study. The survey questionnaire was divided into four parts: (1) demographic profile, (2) gaming experience, (3) awareness of present gamification tools, and (4) acceptance of newly added gamification tools. The student's demographic profile contained their personal information and academic information. Academic information encompassed information on the year in which the student entered college, their previous and running general weighted average (GWA), their record of failing grades, and what subjects they failed. The gaming experience was designed to determine the students' videogame engagement, derived from the survey instrument developed by Zaib Abbasi et al. (2017), which followed the general procedure suggested by Churchill (1979) in developing the scale. The section of the survey instrument used from the previous studies was the demographic gaming profile. The demographic gaming profile is only used because this study focused on determining and exploring the factors for measuring the students' acceptability on the proposed gamification tools.

For the awareness of the current gamification tools, the students were asked if they were aware of game elements utilized in online education and if they were also aware of the existing gamification tools in Blackboard LMS. Additionally, a 5-point Likert scale was used to determine if students believe in the effectiveness of gamification tools present in the LMS as data for supporting the results and analysis. Students were also asked whether they have prior experience in using gamification tools and what specific gamification tools they think were used or currently in use on the IE courses. User acceptance focused on the students' perception about utilizing new gamification tools tailored to their subjects' requirements. The questions in this survey followed the general concept of the Technology Acceptance Model (TAM), as reviewed by Lai (2017). Following the procedure and application of TAM by (Weng et al. 2018), this part of the survey questionnaire included eighteen (18) questions (see Table 2) measured using a 5-point Likert frequency scale. All items utilized a non-cognitive verbal frequency scale of 1 - strongly disagree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree, and 5 - strongly agree.

4. Results and Discussion

4.1 Gamification Tools for Education

Jackson (2016) identified six gamification elements that could be used in LMS. The *achievement* element documents the learner's progress in the subject, which could motivate the learner to continue and move forward on their learning progress. Under this element is the famous PBL triad of gamification – "points, badges, leaderboards" (Lamprinou and Paraskeva, 2015). *Rewards* are the element where the system would give out a prize when one completes their task or gets an achievement. Examples of tools for rewards are bonuses, resources, and power-ups. *Story* is a game element that allows the learner to immerse themselves in a particular scenario. It is beneficial during problem analyses where story narration and quests help learners better understand the given problem scenario. The *time* element in a game is usually linked to encouraging a player or a learner to execute their tasks as soonest as possible. Countdowns and scheduling are some of the tools that could push a student in completing their tasks. *Personalization* is the element that allows the learner to customize their avatars in an online setup, creating individuality. Lastly, *microinteractions* (e.g. animations or sound effects) are the small details that could better engage students in using the LMS.

The gamification tools present in Blackboard LMS that were utilized in this study were Achievements, Goal Performance, Tasks, and Badges. The Time element is often seen during online quizzes, in the form of a timer, while the Microinteractions are often overlooked or are unnoticeable. Generally, under the *Tools* tab in the LMS, the prominent gamification tools offered by Blackboard are the Goals and Goal Performance. The *Goals* lists all the course

goals for each course under each program offered by the institution. However, this does not allow the students to tick each course goal they have achieved, nor does it suggest that the LMS automatically gives a checkmark for every course that the student finishes. Meanwhile, the *Goal Performance* seemed to have a structured query language (SQL) compilation error and was generally inaccessible for the students. It is understood that this is the *Goal Performance* Dashboard that is connected to the *Goal Performance* of each enrolled course in the LMS but is also not utilized. Regardless, both of these tools do not satisfy the personalization of feedback that influences the students' perception of interaction in online learning, as highlighted by Cheng (2014), nor do they encourage regular interaction among the students and the course contents. Thus, an ergonomic intervention on the system design is needed to improve the student's learnability assessment.

As previously enumerated, relevant gamification tools in this study can all be accessed within each enrolled course homepage. The Achievements shows earned and unearned goals one student had in each course set by the course instructor. With that being said, the utilization of this tool is upon the instructor's discretion. It cannot be personalized by the students, nor does the achievements automatically appear, following the course syllabus. After all, the course syllabus is not integrated within the course homepage and the instructors manually set the grades to follow what is in the syllabus. The Goal Performance supposedly shows the student's achievement towards a course goal. It uses color codes to display the student's scores in each assessment or requirement of the professor. The utilization of these tools is also upon the discretion of the instructor, should they want to attach a goal or achievement with the assignments and other submittals they set for the course. Tasks are used to keep track and remind students of the pending assessments that need to be submitted. Contrary to belief, submission links and other activities that are given to the students do not automatically add to the tasks list. This tool is also not connected to the LMS Calendar, which automatically plots the due dates for each activity in their respective times. There are no options under this tool that allow the students to manually input tasks for a course. It also appears that the utilization of this tool is also upon the discretion of the instructor. While the Calendar allows the student to personalize their schedule, it only allows them to add an event and not a task to tick out once they have finished. However, the submittals with due dates do automatically remove themselves from the list of deliverables in the student's Activity Stream. There is also no dashboard of any kind that summarizes the tasks under each course. Lastly, the Badges are displayed to notify the students about their academic performance within the class. It can be seen in the student's Activity Stream and can be filtered out depending on the student's notification preferences. The Badge shows the student's performance by describing their class performance as "Above Average" or "Below Average." It offers to direct the student to a "How Am I Doing?" tab that supposedly summarizes the Goal Performance or a helpful visual from the Grades tab. However, all the badges that direct to this tab do not have any data to display.

Rayner (2010) has summed up the importance of "personal diversity" and "individual differences" with regards to the psychology of the students, particularly in the cognitive learning styles and preferences, for effective learning. While the LMS understands the psychology of the learners and the different factors influencing their learning performance, the utilization and personalization of the tools available are lacking. The common denominator for all the present gamification tools in Blackboard LMS is the students' access or lack thereof since using the tools is not a requirement of the HEI for blended learning or a fully online mode of delivery. Additionally, allowing access and setting up each gamification tool is another workload for the instructors who are handling multiple sections of various subject. With all these and the apparent misutilization of the tools considered, it seems that they do not encourage student engagement and motivation in and of themselves. Ergonomic intervention is needed to maintain the consistent rise in the quarterly weighted average (QWA) and running GWA and to use the five pedagogical approaches (Official Gazette of the Republic of the Philippines, 2013) in the HEI's LMS. Simultaneously, this intervention ensures that there are no other factors, like cheating, involved.

Aside from the additional work given to instructors, one of the issues why the gamification tools are not utilized is the uncertainty around selecting an appropriate tool that will boost the students' engagement and motivation. The first step to identify which gamification tools are appropriate to use by the selected IE courses is to classify the type of learning objectives one subject aims following the revised Bloom's Taxonomy of Educational Objectives by Anderson and Bloom (2001). The revised Bloom's Taxonomy included six classes. *Remember* pertains to the recognition and recall of the knowledge from memory. *Understand* includes the learner's ability to interpret, compute, classify, summarize, explain, and compare the knowledge they gained from "remembering." *Apply* is how one uses the knowledge to implement and execute it in real-life situations. To *analyze* is how learners deconstruct what they learned and relate it to different concepts and elements. *Evaluating* shows that a learner knows to make decisions based on the gathered

materials. Lastly, the highest form of a learning objective is to allow a student to *create* and produce output based on the transformed knowledge which undergoes the previous five classes or stages (Colorado Collage, 2021).

The learning outcomes for each IE courses were paired against the learning objectives according to Bloom's Taxonomy of Educational Objectives. The decision matrix illustrated in Table 3 shows the appropriate gamification tools to use based on the ability to comply with Revised Bloom's Taxonomy satisfactorily.

Table 2. Gamification Tools to be Used per Level in Bloom's Taxonomy

Gamification Tools	**Revised Bloom's Taxonomy of Educational Objectives**					
	Remember	*Understand*	*Apply*	*Analyze*	*Evaluate*	*Create*
Achievement	✓	✓	✓		✓	✓
Rewards		✓	✓			✓
Story				✓	✓	
Time			✓		✓	
Personalization						✓
Microinteractions				✓	✓	

The *Achievement* could comply with all levels of learning objectives, excluding Analyze. The *Analyze* hierarchical level of learning objectives does not produce outputs. However, instead, it involved the process of transforming information. Thus, the *Achievement* element would not aid a learning objective that analyzes information. Moreover, because Rewards are generally used as an aid for Achievements, it would create a synergy effect when paired with the Achievement in the same learning objectives. However, it would be most useful to give out "rewards" when a learner achieved a higher level of learning. Thus, rewards are assigned for Understand, Apply and Create learning objectives. The Story element would be useful for a learner when they analyze and evaluate needed information necessary for a certain kind of situation. Hence, Microinteractions would also help learners immerse themselves in the situation or case study presented to them. Therefore, it was assigned to the same learning objectives as the Story element. Time element would be most likely associated with Apply and Evaluate learning objectives measured through learning assessments and/or exams. Lastly, Personalization would be linked to the Create learning objective, where the learner would produce an actual output based on the lessons they have learned.

There were only five (5) IE courses for 2nd and 3rd year level that satisfactorily met the criteria to use all types of gamification tools. These subjects are major courses in the curriculum that include Operations Research 1 and 2, Computer Integrated Manufacturing Laboratory, Information Systems, Systems Engineering, and Methods of Research. These would make sense as these subjects also achieved the highest level of learning objectives which is Create. However, in integrating these gamification tools in the entirety of the Cardinal EDGE, not all subjects could utilize all elements. Therefore, it would be more appropriate to integrate gamification tools that would satisfy all subjects. The gamification tools that could satisfy all IE courses would be Achievements and Rewards.

4.2 Gaming Experience and Awareness

Over half of the respondents (54%) were female, and their ages varied from 18 to 22 years old. The majority of the respondents are aged 20 and 21 who are currently on their year 3 of matriculation. The data reports that during the period of study, 60% have a QWA of 1.75 and higher, which qualifies them for an academic scholarship or allows them to maintain other scholarship or financial assistance program. The results for those students with scholarships (62%) are consistent with this finding. However, it remains that 46% of the respondents have a running GWA of 2.50 to 2.00, and only 8% have a running GWA in the upper range ($1.00 \leq QWA \leq 1.50$). Data also shows that the students generally received a higher grade during the fully online mode for the quarter but had received considerably lower grades before this.

Vis-à-vis the new age of online learning, multitasking (Lepp et al. 2019), and an increase in time playing videogames (Anand, 2007) are expected to have an adverse effect on the students' academic performance. The survey results show that 34% of the students play a few times a week, 32% play once a week, and 22% play every day. Additionally, 82% of the students play for an average of 1 to 4 hours a day, 16% play an average of 4 to 8 hours a day, and the remaining

2% play for about 8 to 12 hours a day. Students who play once a week appear to have the higher QWA (Max = 1.05, Min. = 1.20), while those who play every day have the relatively lowest QWA (Max = 1.47, Min. = 1.53). The same cannot be said for the GWA since it appears that those who never play games have the highest running GWA (1.90), but those who play every day have the highest average running GWA (1.9438). The results also show that students who spend more time playing games tend to have a higher running GWA. The highest average QWA goes to those who play once a week for 4 to 8 hours (QWA = 1.39), while the highest average running GWA goes to students who play every day for 8 to 12 hours (GWA = 1.60). This appears to be consistent with the 'Play hard – Study hard' approach which tells that playing videogames proves to be beneficial for most excellent students (Adžić et al. 2021). Students who always play games from the Family entertainment genre appear to have higher running GWA (Max. = 1.58, Min. = 2.00) and on the 1st Quarter GWA (Average GWA = 1.54). However, it should be noted that during the period of study, students who frequently play Adventure games procured the lowest QWA and GWA, primarily due to the amount of time they should invest in advancing in the game's storyline.

When asked about the general concept of gamification, 66% reported that they were unaware of game elements in learning. However, when presented the different types of gamification tools currently present in Blackboard, only 24% stated that they had not seen nor heard of the tools in the LMS. For the rest of the respondents who were completely aware of the present gamification tools, 90% of them had known of the Badge tool, 61% were aware of the Achievement, 55% for Tasks, and 40% for the Goal Performance Tool. Despite being aware of the different tools integrated into the LMS, it was deemed that they were unaware or had not known that these tools were gamification tools. It suggests that while the gamification tools are present, they were either visible but not used, or underutilized to the degree that its functions do not serve the students as well as it is intended to. When asked about the present gamification tools' effectiveness, Tasks generated a slightly higher rating with a value of 3.26. It was also observed that respondents belonging to lower year level gave higher ratings for the present gamification tools than the higher level batches. One possible reason for this was that lower year students have only spent 3 academic terms in the HEI using the traditional face-to-face classes and spent more time dealing with online classes due to the current pandemic faced at the time of writing.

Tables 4 presents the summary of results of the Reliability and Item Analysis using Statistica software. It pertains to the evaluation of the survey questionnaire's internal consistency. A subjective survey questionnaire with an acceptable internal consistency means that the survey results would be the same even when respondents were asked to retake the survey. It can be observed that the Cronbach's Alpha for each group of questions is greater than 0.90, indicating that the internal consistency is generally acceptable (Taber, 2018). Hence, the results show that the questionnaire prepared is a reliable measurement instrument in determining the students' acceptance of the gamification tools.

Table 4. Summary of Reliability and Item Analysis

Item	Cronbach's Alpha
Perceived Ease of Use (PEOU)	0.901559
Perceived Usefulness (PU)	0.952803
Attitude Toward Using (ATU)	0.930003
Intention to Use (ITU)	0.928586

4.3 TAM Model

The effect of each variable in the TAM model, as hypothesized in Table 1, were investigated and each question's ordinal score under each domain (i.e., PEOU, PU, ATU, and ITU) was averaged. Table 5 presents the hypothesis that the Perceived Ease of Use has a significant effect on the Perceived Usefulness of the gamification tools. The p-value for the PEOU indicates that the coefficient is significant since it is less than the significance level ($\alpha = 0.05$). The

coefficient of 0.664 indicates a positive relationship between the PEOU and PU; that is, the PU score increases by 0.664 for every unit increase in the score for PEOU. PEOU has a significant influence on the PU. Therefore, H1 is supported.

Table 5. Regression Analysis of PEOU vs. PU (H1)

	b*	Std.Err. of b*	b	Std.Err. of b	t(48)	p-value
Intercept			0.641	0.530	1.210	0.232
PEOU	**0.664**	0.108	0.829	0.134	6.158	**0.000**

Table 6 tests the hypothesis that the Perceived Ease of Use and Perceived Usefulness has a significant effect on the students' Attitude Towards Using the gamification tools. The p-value for the PEOU and PU indicates that the coefficients are significant since they are both less than the significance level ($\alpha = 0.05$). The PEOU has a coefficient of 0.24, which indicates a positive relationship between the PEOU and the ATU; that is, the score for the ATU increases by 0.24 for every unit increase in the score for PEOU, all other variable remaining at the same level. Meanwhile, the PU has a coefficient of 0.705, which also indicates a positive relationship between the PU and the ATU; that is, the ATU score increases by 0.705 for every unit increase in the score for PU, all other variables remaining at the same level. Both the PEOU and PU have a significant influence on the ATU of the students. Therefore, H2 is supported.

Table 6. Multiple Regression Analysis of PEOU and PU vs. ATU (H2)

	b*	Std.Err. of b*	b	Std.Err. of b	t(48)	p-value
Intercept			0.360	0.319	1.128	0.265
PEOU	**0.240**	0.092	0.281	0.107	2.626	**0.012**
PU	**0.705**	0.092	0.660	0.086	7.706	**0.000**

Table 7 tests the hypothesis that the Perceived Usefulness and Attitude Towards Using has a significant effect on the students' Intention to Use the gamification tools. The p-value for the PU is greater than the significance level ($\alpha = 0.05$), which indicates that the coefficient is not significantly different from zero (0). In contrast to prior research, PU does not have a significant influence on the students' ITU. However, the p-value for the ATU indicates that the coefficient is significant since it is less than the significance level ($\alpha = 0.05$). The coefficient of ATU is 0.647, which indicates a positive relationship between the ATU and the ITU; that is, the score for the ITU increases by 0.647 for every unit increase in the score for the ATU, all other variables remaining at the same level. Since only the ATU has a significant influence on the ITU of the students based on the gathered data, H3 is not supported.

Table 7. Multiple Regression Analysis of PU and ATU vs. ITU (H3)

	b*	Std.Err. of b*	b	Std.Err. of b	t(47)	p-value
Intercept			0.437	0.291	1.499	0.140
PU	**0.247**	0.143	0.228	0.133	1.721	**0.0917**
ATU	**0.647**	0.143	0.640	0.142	4.514	**0.000**

Figure 3 summarized the results of the regression analysis and hypothesis testing. From the data collected, results show that the perceived ease of use significantly affects the students' perceived usefulness and attitude in using gamification tools. Consequently, the perceived usefulness also affects the attitude towards usin and the attitude towards using also affects the students' intention in using the gamification tools. However, this does not mean that one student will use the gamification tool even if they thought it was useful in their online classes. It can be attributed to the fact that the students cannot modify the gamification tools in the Blackboard LMS and that it is upon the instructor's discretion to use them. This does not allow them to maximize the tools nor even use them, despite how useful they perceive them to be. The LMS design is simple and straightforward in that it satisfies the learnability criteria (Nielsen, 2010). However, it is easier to use other applications or software to track progress or manage their course deliverables, such as Google Tasks. The fluidity of Google apps and connectivity with third-party applications or Add-ons makes up an excellent dynamic workflow. Furthermore, the course syllabus is not embedded within the course homepage and tools, which makes it even harder for both the students and the professors since everything has to be set manually.

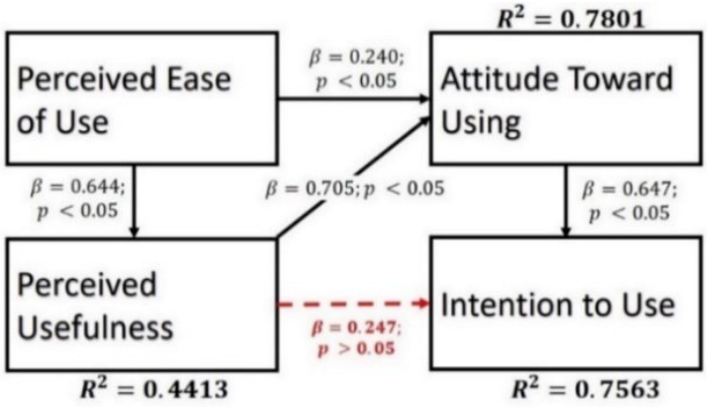

Figure 3. Summary of Results on the TAM Framework

6. Conclusion

The utilization of gamification tools is becoming prominent as the number of HEIs that integrate LMS in their curriculum continues to increase. This study was able to determine the appropriate gamification tools for IE courses and the IE students' acceptance in using gamification tools in their online classes. Following the mixed-methods approach, the results from the literature review revealed that not all types of gamification tools could be applied to all IE courses. Mainly, Achievement and Reward were the gamification tools that were applicable and suitable for all. Results of the survey also revealed that only 76% were aware of the present gamification tools in Blackboard LMS. Current gamification tools were rated fair for their effectiveness. Respondents also showed a positive attitude on the possibility of using other types of gamification tools and were deemed as useful and easy to use. Nonetheless, their attitude towards using and the ease of use and usefulness of gamification tools did not affect the respondents' intention to use gamification tools personally. The findings in this study indicate that there is a need to improve the gamification tools in the HEI's LMS. Future research may evaluate and develop a design for different types of gamification tools that satisfy the criteria developed for learning objectives. It is also recommended to use this study to evaluate the gamification tools present in LMS from the instructor' perspective.

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Biographies

Renée Hannah A. Niro is an undergraduate student of Mapúa University taking her BS degree in Industrial Engineering. She is currently finishing her BS degree in Industrial Engineering and Lean Six Sigma Yellow Belt Certification Program from AskLex PH. She has published a conference paper together with other student researchers in the 2020 7th ICFIE. Her research interests include human factors, ergonomics, optimization, scheduling, and lean six sigma. She has served as a member of the Philippine Institute of Industrial Engineers (PIIE) and an officer for the Operations Research Society of the Philippines – Mapua Student Chapter (ORSP-MSC) and Student Federation (ORSP-SF).

Via Shereen L. Daracan is an undergraduate student of Mapúa University taking her BS degree in Industrial Engineering. She serves as an officer for the Operations Research Society of the Philippines – Mapua Student Chapter (ORSP-MSC), assuming the position of Financial Manager. She had published a conference paper along with other students at the 2020 7th International Conference on Frontiers of Industrial Engineering (ICFIE) and is currently awaiting another publication at the 2020 7th International Conference on Engineering Technologies and Applied Sciences (ICETAS). Her research interests include work measurement, methods engineering, facility design and layout, optimization, human factors, and ergonomics.

Arvin Joseph D. Pizarro is an undergraduate student at Mapua Institute currently taking his BS degree in Service Engineering and Management. His research interests include human factors and ergonomics, and optimization.

Josephine D. German is a faculty member of the School of Industrial Engineering and Engineering Management at Mapua University. She has earned her BS in Industrial Engineering and Master of Engineering (major in IE) from the

same University. She is a Professional Industrial Engineer (PIE) with over 15 years of experience and has taught several courses in IE. She has done several research projects in the field of logistics and supply chain management, systems modelling, entrepreneurship, risk management, vulnerability assessments, and ergonomics and has an extensive experience in academic audits and accreditations. She is also a member of the Philippine Institute of Industrial Engineers (PIIE).