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Assessing the Effect of Gamification in Increasing the Mastery Level of Grade 8 Students in Technology and Livelihood Education

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Abstract

This study aims to investigate whether the gamification in lesson can help on increasing the mastery level of grade 8 students. Gamification, it refers to the application game design elements to an educational setting where competition, points, badges, and rewards helps enhance students' engagement and motivation. The main goal is to make learning more engaging and interesting specially for learners with short attention span. The research involved a pre-test at the beginning of the quarter, discussion of the lessons with the use of gamification and post-test at the end of the quarter to collect data if the used of gamification really helps in increasing the mastery level of students. Hence, the data supports the assertion that the use of gamification in TLE 8 lessons has resulted in a significant enhancement in student performance. The significant difference between pre-test and post-test scores indicates that gamification has positively impacted the students' learning outcomes.

Keywords: Gamification; Pre-test; Post-test.

1. Introduction

According to **William G. Scout**, *"Motivation means a process of stimulating people to action to accomplish desired goals".* [1] According to **Fred Luthans**, *"Motivation is the process which begins with a physiological or psychological need or deficiency which triggers behavior or a drive that is aimed at a goal or incentive."*[1]. Motivation is an essential ingredient in effective teaching and learning. It not only yields more positive behaviour in students, but it also contributes to a greater sense of wellbeing.

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In education, motivation helps children and young people to focus their attention on a key goal or outcome. In doing so, they are unfazed by possible distractions, and are therefore able to maintain their attention during longer periods of time. Students who are motivated display goal-orientated behaviours. They take initiative, show resilience, harness their curiosity, and care for and respect their work. They are equipped to orchestrate their own learning journey [2].

Intrinsic motivation is defined as the doing of an activity for its inherent satisfaction rather than for some separable consequence. When intrinsically motivated, a person is moved to act for the fun or challenge entailed rather than because of external products, pressures, or rewards. Extrinsic motivation is a construct that pertains whenever an activity is done in order to attain some separable outcome. Extrinsic motivation thus contrasts with intrinsic motivation, which refers to doing an activity simply for the enjoyment of the activity itself, rather than its instrumental value [3].

Sometimes a course of study is so fascinating and useful to students that they are willing to do the work required to learn the material with no incentive other than the interest level of the material itself. For example, many students would gladly take auto mechanics or photography courses and work hard in them, even if the courses offered no credit or grades. For these students the favorite subject itself has enough intrinsic incentive value to motivate them to learn. Other students love to learn about particular topics such as sports, insects, dinosaurs, or famous people in history and need little encouragement or reward to do so (Gottfried & Fleming, 2001; Schraw, Flowerday, & Lehman, 2001). Students who have a strong "future time perspective" (i.e., are willing to do things today that may benefit them in the future) are often particularly motivated to learn, even without immediate incentives (Husman & Lens, 1999). However, much of what must be learned in school is not inherently interesting or useful to most students in the short run. Students receive about 900 hours of instruction every year, and intrinsic interest alone will not keep them enthusiastically working day in and day out. In particular, students' intrinsic motivation generally declines from early elementary school through secondary school (Gottfried & Fleming, 2001; Sethi, Drake, Dialdin, & Lepper, 1995). It also declines over the course of each school year (Corpus, McClintic-Gilbert, & Hayenga, 2009). For this reason, schools apply a variety of extrinsic incentives, rewards for learning that are not inherent in the material being learned (Wentzel & Brophy, 2014). Extrinsic rewards range from praise to grades to recognition to prizes or other rewards [4].

Here comes gamification. Gamification in education means that educators apply game design elements to an educational setting. The goal is usually to make learning more engaging [5]. Generally, gamification refers to the functionality of interactive systems that leverage the use and mechanics of game elements to motivate or engage end-users [6] .A boring lessons becomes fun that arouses intrinsic motivation and the reward system that increases extrinsic motivation.A classroom reward system for teachers involves rewarding students' positive behaviour and academic achievements through rewards like stickers, points, extra recess time, or small prizes. It aims to motivate students, foster a positive learning environment, and reinforce desirable behaviours [7]. According to Eric Klopfer, Scot Osterweil, and Katie Salen of the Massachusetts Institute of Technology (MIT), the role of play is important for children, as it gives them the freedom to fail, experiment, and fashion identities. "The starkly obvious difference between games and traditional schooling is that good games always involve play, and schooling rarely does," they wrote [8]. Games can introduce goals, interaction, feedback, problem solving, competition, narrative,

and fun learning environments, elements that can increase learner engagement and sustain motivation [9].

This is what most of the teachers are forgetting, on how to make the lesson fun. In the 21st century, traditional teaching is out, and with the exposure of gadgets and new technologies the 21st learners develop a short attention span. The average attention span for the notoriously ill-focused goldfish is nine seconds, but according to a new study from Microsoft Corp., people now generally lose concentration after eight seconds, highlighting the effects of an increasingly digitalized lifestyle on the brain [10]. In consideration to this, teachers must think of a way to preserve that attention with the help gamification. TLE teachers face challenges in maintaining students' interest and motivation in the subject TLE because it is a minor subject in comparison with Mathematics, Science and English. Some students consider minor subjects as unimportant or it is a subject that doesn't need efforts to passed.

The result from the diagnostic test for the school year 2021 – 2022 for grade 8 shows that the competencies such as prepare salting and curing solutions and mixtures determined as low proficiency with only 31.77% level of mastery as compared with other competencies for 4th quarter. Thus, the researcher inclined to using gamification to address this pressing issue. Gamification has a potential solution to enhance student engagement and promote deeper learning. By incorporating game elements into the learning process, gamification can provide a fun learning experience and can help improve students' mastery levels.

Innovation, Intervention, and Strategy

Adapting gamification as part of instruction materials in TLE subject was utilized during the 4th Quarter of the school year 2022-2023 to determine whether it can help in increasing the mastery level of Grade 8 students.

Gamification is focused on improving the mastery level on the following learning competencies:

Table 1

Competencies	**Gamification Used**
1. Measure and weigh required ingredients for pumping pickle, cover pickle and dry cure mixture in line with approved specifications	Amazing Pickle Race
2. Cure mixture at room temperature or refrigerated temperature at appropriate number of days	Family Feud and Yes-No Steppers
3. Submerged materials being cured in solution to obtain even distribution/ penetration of cure mixture in line with approved specifications	
4. Wash and drain cured food materials from the solution, in accordance with standard operating procedures	
5. Boil and dip in grana solution salted eggs according to approved specifications	
6. Transfer the cooked products to containers and cool according to specifications.	

In order to utilize the gamification as instructional materials and improve the mastery level in TLE the following

steps were conducted:

Step 1: Conduct pre-test:

Step 2: Crafting, Editing of Daily Lesson Plan:

Step 3: Discussing of the lessons with adaptation of gamification:

Step 4: Conduct Post Test:

The table below shows the conduct of the innovation

Table 2

Pre-Implementation	Implementation	Post Implementation
✓ Pre-test ✓ Crafting lesson plan with the integration of gamification.	✓ Lesson presentation with gamification	✓ Post-test

1.1 Action Research Questions

This study aimed to determine the effect of gamification in increasing the mastery level of grade 8 students in Mambugan National High School for the school year 2022-2023. Specifically, this study pursues to answer the following questions:

1. What are the scores of Grade 8 students in TLE before the implementation of the gamification?
2. What are the scores of Grade 8 students in TLE after the implementation of the gamification?
3. Is there a significant difference between the pre-test and posttest of the students using the gamification?

1.2 Action Research Methods

Participants and/or Other Sources of Data and Information

The main objective of the study is to determine the positive impact of gamification during lessons and to explore its benefits.

Quasi-experimental research will be utilized. The data are obtained by letting the students answering Pre-test before the application of gamification and answering post-test after creating a gamified lesson. The participants in this research will be the students from Mambugan National High School where the researcher is currently affiliated and currently teaching as a TLE teacher. Stratified proportional random sampling was conducted in order to select the respondents to have an equal proportion of respondents in each section of grade eight level. Table below shows the total number of respondents in the study.

Table 3

Section	**N**
Edsa	41
Kawit	47
Loboc	47
Sultan Kudarat	48
Overall	183

The students took the pre-test and post-test to determine if there would be a significant difference between the scores of the students before and after gamified lessons.

1.3 Data Gathering Method

The teacher informed the students during the conduct of pre-test regarding the collection of data base on the result of their pre-test. During the lesson, capturing of pictures is with the permission of students and their parents. The survey was conducted to the participants during their lesson time that is convenient in their learnings. The respondents were assured that the data collected will be kept confidential and was used for research purposes only. The information collected was destroyed after the data analysis so as to ensure strict confidentiality. Thus, the following data collection method was used.

1.4 Plan for Data Analysis

The data gathered were analyzed using frequency mean, standard deviation, weighted mean and paired sample t-test.

Mean – it was used to identify mastery level of grade 8 students.

Paired T-test – it was used to identify if there is a significant improvement on the result of the pre-test and post-test

1. 6 Discussion of Results and Reflection

The data gathered through the use of the different instruments are hereby presented in this chapter. Analysis of data was made with appropriate interpretations and inferences so that conclusions may be drawn.

Problem 1. What are the scores of Grade 8 students in TLE before the implementation of the gamification?

The validated 60-item test was administered to the 183 students. The table below shows the distribution of scores of students in TLE before the implementation of the gamification, the mean and standard deviation of the Grade 8 students under study.

Table 4: Distribution of Pre-test Scores of the Subjects of the Study

Scores	**Frequency**	**Percentage**	**Descriptive Equivalent**
54-60	0	0.00%	Highly Proficient
45-53	26	14.21%	Proficient
30-44	118	64.48%	Moderately Proficient
15-24	29	15.85%	Least Proficient
1-14	10	5.46%	None Proficient
Total	183	100	
Mean	**35.87**		**Moderate Competence**
SD	**8.70**		

The table 4 shows that most of the students falls in the category as “Moderately Proficient ". For the range of scores of 45-53, 26 students or 14.21% of the total respondents belongs to "Proficient". However, most of the students scored in the range of 30-44 with 64.48% of the total respondents or 118 students falls under "Moderately Proficient ". The range of 15-24 has 29 students representing 15.85% of the total respondents categorized as "Least Proficient". Finally, the range of 1-14 has 10 students, making up 5.46% of the total respondents falls under "None Proficient ".

Moreover, the standard deviation of 8.70 indicates that the scores of the students were widely scattered as disclosed from the data above wherein the lowest score range is from 1-14 and the highest score range is from 45-53 with the mean of 35.87 which is Moderately Proficient. It can be deduced that the pre- knowledge of the students in TLE 8 is insufficient.

In summary, the data shows a distribution of competence levels across different score ranges. The majority of individuals fall into the moderately proficient range (30-44), while a smaller proportion demonstrates low proficient. The ranges of highly proficient and none proficient have no individuals in this particular dataset.

Problem 2. What are the scores of Grade 8 students in TLE after the implementation of the gamification?

To evaluate the performance of the students in the post-test after the implementation of gamification. They were given the same set of test questions as in the pre-test. The scores were tallied, and the frequency distribution, mean and standard deviation were determined. The results are shown in Table 5.

Table 5: Distribution of Post-test Scores of the Subjects of the Study

Scores	**Frequency**	**Percentage**	**Descriptive Equivalent**
54-60	47	25.68%	Highly Proficient
45-53	75	40.98%	Proficient
30-44	53	28.96%	Moderately Proficient
15-24	8	4.37%	Least Proficient
1-14	0	0.00%	None Proficient
Total	183	100	
Mean	**48.08**		**High Competence**
SD	**8.60**		

As shown on Table 2, 47 students or 25.68% belongs to Highly Proficient in the 60-item test and the scores were in the range of 54-60. On the other hand, majority of the students which composed of 75 or 40.98% belongs to Proficient with the range of score of 45-53.

It is also shown on the table under Moderately Proficient that is in the range of 30- 44 scores is composed of 53 students or 28.96% and only 8 students or 4.37% retained in low competence on the range of scores 15-24. Hence, no students scored in the range of 1-14.

Furthermore, the mean score, calculated to be 48.08, falls within the range of "Proficient", suggesting that, on average, the students demonstrate a high level of competence in the post test. The standard deviation of 8.60 provides information that there is some variability in the scores, but the majority of the scores are relatively close to the mean.

In summary, the majority of the students showed high proficiency, with only a small percentage falling into the lower competence categories. The mean score indicates an overall high proficiency, and the standard deviation suggests moderate variability in the scores.

Problem 3: Is there a significant difference between the pre-test and post-test of the students using the gamification?

To determine if there exists a significant difference in the mean scores from the pre-test to post-test of the students, the data were subjected to paired sample t-test and the results were compared to the critical value. All computations were done at 5% alpha level of significance. The results are presented in Table 6.

Table 6: Difference between the Pre-test and Post-test Scores of the Subjects of the Study

Paired Samples Test

Grade Level	PAIRED	Paired Differences		t	df	p-value	Verbal Interpretation
		Mean	Std. Deviation				
Eight	**Pre-test - Posttest**	-12.20	11.45	-14.42	**181**	.000	Significant

The table shows that the compute p-value for paired sample t-test of pre-test and post-test is 0.000 which is less than the alpha level of 0.05 indicates that the pre-test and post-test has significant difference in overall and also in each section. Therefore, there is a significant increase on the performance of the students as reflected on the pre – test and post – test results with the use of gamification in TLE 8 lessons.

In conclusion, based on the data collected, there is sufficient evidence to establish a relationship, namely the fact that there is a significant improvement in the students' achievement because of the implementation of gamification in TLE 8 lessons. This great difference already shows that gamification had a positive impact, as it generally improved the learning outcomes of students at this level, compared to the pre-test or control class scores. The pre-test mean score of 35.87 increased to a post-test mean score of 48.08, which falls under the rating High Competence. This represents a substantial improvement of about 34%.

These findings indicate that gamified lessons enhance the performance and engagement levels of learners. It is against this backdrop that gamification may be an effective mechanism upon which educational strategies can be based to ensure better learning outcomes. Future studies may, therefore, look at the long-term effects of gamification and its applicability across a number of different subjects and educational levels.

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References

[1] Sharma, T**.** *Meaning, Importance and Theories of Motivation***.** https://ebooks.inflibnet.ac.in/mgmtp05/chapter/meaning-importance-and-theories-of-motivation/#:~:text=According%20to%20William%20G.,at%20a%20goal%20or%20incentive.%E2%8

0%9D (accessed Jul. 7, 2024)

[2] Hawthorne, Hannah. *Understanding the Importance of Motivation in Education.* https://www.highspeedtraining.co.uk/hub/motivation-in-education/ (accessed Jul. 7, 2024)

[3] Nickerson, C, *Extrinsic Vs. Intrinsic Motivation: What's The Difference?* https://www.simplypsychology.org/differences-between-extrinsic-and-intrinsic-motivation.html (accessed Jul. 7, 2024)

[4] Slavin, R, Educational Psychology Theory And Pract Ice, 12 ed. New York, Pearson Education, Inc., 2018.

[5] Blankman, R. Gamification in Education: The Fun of Learning. https://www.hmhco.com/blog/what-is-gamification-in-education (accessed Jul. 7, 2024)

[6] Seaborn, K., and Fels, D. I. (2015). Gamification in theory and action: a survey. *Int. J. Hum. Comput. Stud.* 74, 14–31. doi: 10.1016/j.ijhcs.2014.09.006

[7] Team Varthana. *Why is it important to have a classroom reward system? https://varthana.com/school/why-is-it-important-to-have-a-classroom-reward-system/#:~:text=A%20classroom%20reward%20system%20for,environment%2C%20and%20reinforce%20desirable%20behaviours.* (accessed Jul. 7, 2024)

[8] Klopfer, Eric & Osterweil, Scot & Salen, Katie. (2009). *Moving learning games forward.* [On-line]

https://education.mit.edu/wp-content/uploads/2018/10/MovingLearningGamesForward_EdArcade.pdf (accessed June 19, 2024)

[9] https://uwaterloo.ca/centre-for-teaching-excellence/catalogs/tip-sheets/gamification-and-game-based-learning (accessed Jul. 7, 2024).

[10] Mcspadden, K. *You Now Have a Shorter Attention Span Than a Goldfish*. https://time.com/3858309/attention-spans-goldfish/ (accessed June 19, 2024)

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