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PR 2 Memory Lane Game: A Reviewer App For Practical Research 2

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***Abstract*—** This study developed and evaluated PR 2 Memory Lane Game, a game-based reviewer application designed to help Grade 12 students improve their understanding, retention, and motivation in learning Practical Research 2 (PR 2). Using an innovative research design guided by the Input–Process–Output (IPO) model, the study assessed the app's acceptability in terms of efficacy, accuracy, reliability, security, user-friendliness, game design, and engagement. Eighteen (18) participants consisting of students, teachers, and information technology experts were selected through purposive and snowball sampling. Data were collected using validated survey questionnaires. These were analyzed through statistical and thematic analyses. The findings revealed that PR 2 Memory Lane was highly accepted across all components. No significant difference in acceptability level was found when participants were grouped according to sex. Significant differences were observed in reliability and user-friendliness when participants were grouped according to social role. Participants identified quizzes, time limits, sound effects, visuals, and lesson content as the most helpful and engaging features. The study concludes that PR 2 Memory Lane is an effective and engaging reviewer application. It could enhance Grade 12 students' learning experiences in Practical Research 2. This study supports the integration of gamification in senior high school education.

***Keywords*—** education, engagement, gamification, motivation, offline reviewer game app, Practical Research 2, research, retention, senior high school.

INTRODUCTION

Practical Research 2 (PR2) is one of the applied subjects in senior high school under the Department of Education's K to 12 curriculum. The goal of the said subject is to equip the Grade 12 learners with research knowledge and skills useful in college. According to Molina (2019), this was designed to develop learners' critical thinking and solving problems. This teaches them to apply various methods and statistical treatments to draw meaningful conclusions. Despite its clear importance, many students still struggle in PR2 due to poor teamwork, time allocation, and insufficient resources (Lucero, 2018) and understanding concepts.

This study was made to address the last-mentioned factor: understanding concepts. The researchers aimed to develop an offline game app called PR 2 Memory Lane Game. It intends to aid the academic performance of Grade 12 learners. This aims to enhance learners' motivation, engagement, knowledge, and comprehension in PR2 lessons through interactive and fun ways. The study is anchored in the idea of gamification. It is the application of game designs and rules in certain fields that do not necessarily have game environment (Christopoulos & Mystakidis, 2023) such as education, business, etc.

Blackman (2022) stated that gamification in education is used to harness the students' engagement in learning. This was affirmed by the study of Dueñas and Carrion (2024) concluding that online gamification can boost students' engagement. On the other hand, Li et al. (2023) and Jaramillo-Mediavilla et al. (2024) both asserted the benefits of gamification in learners' motivation.

Aside from motivation and engagement, Nob et al. (2024) reported that gamification positively affects the students' academic performance and higher-order thinking skills. Moreover, Medico et al. (2023) first found out that digital gamification could improve learners' achievement, specifically in Mathematics.

Nevertheless, there is no study that explores the potential effects of digital gamification in Practical Research 2. Moreover, there is no specific reviewer game app that addresses the needs in PR2. Gamification review tools alleviate students' academic stress and increase their self-confidence at the same time (Alzahabi et al., 2024). In assumption, a PR 2 reviewer app with games and interactive mode of learning can make the learners have more fun, to be motivated, and to improve their learnings, skills and confidence.

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This study intended to create an offline reviewer app that could potentially help the learners and teachers in studying PR2 or other research subjects. This aimed to determine the level of acceptability of the PR2 Memory Lane Game in terms of efficacy, accuracy, reliability, security, user-friendliness, game design, and engagement. Additionally, its objective was to know its most helpful features and the aspects to be improved.

METHODOLOGY

A. Research Design

This study employed innovative research design. Fiveable (2024) stated that this research design helps in creating new things, concepts, and methods through scientific processes. This research study focused on PR2 Memory Lane Game. This is a reviewer game app of the subject Practical Research 2 (PR2) in Lumil Integrated National High School. This was innovated for the purpose of improving the students' memory retention, understanding, motivation, engagement, and accessibility.

Material and Equipment:

- Laptop
- Internet connection
- Software Tools (VS Code)
- Programming Language (JavaScript)
- React Native
- Expo tool

General Procedure:

Integrating 'React Native' into the Software Development Tool. Before starting the whole process, a software development tool is required for the application to begin the programming. The software development tool used for coding is Visual Studio Code or most referred to as VS Code. After setting up VS Code, the next step is to install a software called React Native that allows the code to be ported in all devices such as Android, IOS, & Desktop.

Setting Up Expo Tools. For the code to be available for viewing and testing, Expo is required. This software enabled the developer to build the application, as well as to view how the code looks in real-time.

Prompting GPT Regarding App Structure. The next process is to prompt a code into Chat GPT about the structure of the application by being specific with regards to the framework of the application. The GPT formed a code where its portions depend on the prompt.

Inputting the Code into the Software Development Tool. First, the developer must be aware to find which part of the code it is supposed to be placed. Now that the code is present, copy and paste the code into the software development tool.

Maintaining and Fixing Errors. This is the most crucial and difficult part of this procedure. The code displayed is bound to contain errors that must be fixed for the whole code to work. Since GPT is a mere Artificial Intelligence tool, it is inevitable that the code will have errors. It requires the developer to scan the entire code to configure the problems within the code. Most of the time, this process involves the developer finding solutions online or from other developers. This maintenance allowed the program to work for its initial testing.

Pilot Testing. This is the phase where the developers were able to test the program. After the errors are fixed, the developer built the application using Expo. This process involves the application to be built depending on the developer's necessity whether it's for Android, IOS, or Desktop. When the build is complete, the device where it will be tested must have Expo present. The build will show a QR code or a link where the application can be downloaded. The device must then choose either of the following options. Next is to launch the application on the device for its pilot testing. This phase displays if the application is functional and if it consists of visible errors such as misplacement of texts. This allows the developer to further improve the errors within the whole or specific part of the code.

B. Participants

This study's target participants consisted of 18 individuals distributed to 6 Research teachers, 6 students from Lumil Integrated National High School and Tagaytay City Science National High School - Integrated Senior High School, and 6 Information and Technology (IT) experts. The researchers used purposive and snowball sampling techniques.

According to Frost (2022), purposive sampling is done to pick the most suitable participants that qualify certain characteristics. Thus, the research goal can be achieved through their answers. In this research, students and

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teachers were purposively selected because they could use the app in teaching-learning process. The teachers must be an English teacher who has taught research subject already. The students must be in Grade 12 and were taking the subject PR 2. In addition, the IT experts were chosen because they could contribute to the technical improvement of the app. The IT experts must be graduates and currently still in their field.

Furthermore, snowball sampling was utilized because the researchers rarely found IT experts who were willing to join in the study. Snowball sampling is implemented through referral method (Alex, 2025) as long as the qualifications are met.

Informed consents were first given and obtained from all participants to certify that they understood the purpose of the study and their rights to withdraw at any time. Participants would then engage in product testing and complete the survey questionnaires to provide feedback on the app's efficacy, accuracy, reliability, security, user-friendliness, game design, and engagement. Throughout the research process, confidentiality will be strictly maintained.

Table 1 presents the projected distribution of the participants according to their sex and social role.

Table 1. *Projected Distribution of Participants*

Social Role	Male	Female	Total
Students	3	3	6
Teachers	3	3	6
IT Experts	3	3	6
Total	9	9	18

C. Research Instrument

Self-made research questionnaire was used in this study as the instrument to measure the efficacy, accuracy, reliability, security, user-friendliness, game design, and engagement of PR 2 Memory Lane Game. The research questionnaire contained information about the participants' sex and social role, the Likert Scale Survey, and open-ended questions.

The survey questionnaire of the study was produced with the related literature consisting of "To learn scientifically, effectively, and enjoyably: A review of educational games (2020)", "The effect of educational games on learning outcomes, student motivation, engagement and satisfaction (2021)" , "Application of the educational game to enhance student learning (2021)" , and "Educational games promote the development of students' computational thinking: a meta-analytic review (2023)". The questionnaire was validated by IT experts and a grammarian.

Table 2 presents the ratings and corresponding descriptions, which the participants used to measure the PR 2 Memory Lane Game's efficacy, accuracy, reliability, security, user-friendliness, game design, and engagement.

Table 2. *Ratings and Descriptions Used in Survey Questionnaire*

Rating	Description
5	Strongly Agree
4	Agree
3	Undecided
2	Disagree
1	Strongly Disagree

D. Work Plan and Target Deliverables

Phase 1 consisted of three main steps. The first step was the determination of the product's concept through brainstorming, and the creation of a research proposal. The research proposal served as an outline that presented the research objectives and questions, as well as the expected outcomes. The next step was the research title defense, where the group presented and justified the chosen topic and its focus. With the approval of the title, it was followed by writing the whole research proposal

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paper. This included the conceptual framework, a review of related literature, and the research methods that were employed.

In Phase 2, this was the start of product realization. This materialized the concept into a prototype for testing and evaluations. The prototype paves the way in gauging the feasibility of the product and the generation of critical insights for its optimization.

In Phase 3, this was going through the proposal defense. The group of researchers received evaluations and insights from a panel of experts with the presentation of their research plan, methodology, and preliminary findings. This phase ensured that the project has experimental integrity and practicality.

In Phase 4, assimilating the feedback from the proposal defense to improve the prototype. This phase essentially focused on optimizing design, functionality, and performance of the product, while also rectifying previously identified limitations. This led to the final defense with the presentation of the improved product, which was critiqued by a panel of experts.

In Phase 5, the researchers began its product testing and surveys in September 2025. Before handing out surveys, informed consent forms were distributed to the participants to obtain their agreement before finally initiating the test and surveys. The survey was conducted from September 2025 to November 2026. The recorded collected went through statistical treatment, analysis, and interpretation to assess the acceptability of PR 2 Memory Lane in terms of its efficacy, accuracy, reliability, security, user-friendliness, game design, and engagement. The findings were presented alongside a data interpretation table, functioning as a visual aid to enhance the understanding and analysis of the varied data obtained during the testing and survey phases. Table 3 was used to determine the acceptability level of Memory Lane Game.

Table 3. *Scale and Description for the Acceptability Level of PR2 Memory Lane Game based on Survey Mean Scores*

Rating	Description
4.21 – 5.00	Highly Acceptable
3.41 – 4.20	Acceptable
2.61 – 3.40	Moderately Acceptable
1.81 – 2.60	Fairly Acceptable
1.00 – 1.80	Poorly Acceptable

In phase 6, the finalization of the draft was done by the researchers in preparation for the final defense, which was presented in front of a panel of experts. After that, the researchers would publish the research paper to reach a wider audience.

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RESULTS AND DISCUSSIONS

Table 4 shows the actual number and equivalent percentage of the respondents based on sex.

Table 4. *Actual Distribution of Participants by Sex*

Sex	F	%
Female	10	55.56
Male	8	44.44
Total	18	100.00

Table 4 shows that there are more female respondents with a percentage of 55.56% compared to the male with 44.44%. The disparity between the female and male was due to the unavailability of other male participants to partake in the study within the given time frame of the study. Table 5 shows the actual number and equivalent percentage of the respondents based on social role.

Table 5. *Actual Distribution of Participants by Social Role*

Social Role	F	%
Students	6	33.33

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Teachers	6	33.33
IT Experts	6	33.33
Total	18	100.00

Table 5 illustrates that there is an even distribution across the three social roles of student, teacher and I.T. Expert as each has a percentage of 33.33%. The social roles were specifically even out to avoid bias and obtain key insights from each role. Table 6 shows the mean score, standard deviation, and descriptors of the participants' acceptability levels of PR2 Memory Lane Game based on survey results.

Table 6. *Mean Score, Standard Deviation, and Descriptors of the Participants' Acceptability Levels of PR2 Memory Lane Game in Survey*

Components	Mean	SD	Description
Efficacy	4.64	0.54	Highly Acceptable
Accuracy	4.76	0.45	Highly Acceptable
Reliability	4.59	0.54	Highly Acceptable
Security	4.56	0.45	Highly Acceptable
User-friendliness	4.77	0.34	Highly Acceptable
Game Design	4.68	0.38	Highly Acceptable
Engagement	4.74	0.43	Highly Acceptable

The table presents that the said app got survey scores ranging from 4.56 to 4.77. User-friendliness had the highest mean score (4.77) Additionally, it had the most consistent survey scores for getting a standard deviation of 0.34. Meanwhile, security had the lowest mean score of 4.56. Nevertheless, all components reached the ideal rating of highly accepted. This implies that the participants appreciated and enjoyed the PR2 Memory Lane Game. Table 7 shows the comparison of the acceptability levels of PR2 Memory Lane Game when the participants are grouped according to sex.

Table 7. *Results of t-Test of Independent Means on the Acceptability Level of PR2 Memory Lane Game based on Participants' Sex*

Components	Sex	Mean	SD	p-value (a=0.05)	Decision
Efficacy	Female Male	4.66 4.63	0.60 0.49	0.90	Fail to reject H0
Accuracy	Female Male	4.70 4.83	0.53 0.36	0.58	Fail to reject H0
Reliability	Female Male	4.58 4.60	0.59 0.50	0.94	Fail to reject H0
Security	Female Male	4.49 4.60	0.50 0.42	0.58	Fail to reject H0
User-friendliness	Female Male	4.76 4.78	0.40 0.29	0.93	Fail to reject H0
Game Design	Female Male	4.66 4.70	0.39 0.39	0.83	Fail to reject H0
Engagement	Female Male	4.78 4.70	0.39 0.49	0.72	Fail to reject H0

The table shows that the computed p-values for all the components are greater than the alpha of 0.05. The null hypothesis is failed to reject. Thus, there is no significant difference on the PR2 Memory Lane Game's acceptability level in all components when participants were grouped according to their sex.

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This tells that both male and female participants have the same level of assessment to the said innovation. Table 8 shows the comparison of the acceptability levels of PR2 Memory Lane Game when the participants are classified based on their social roles.

Table 8. *Results on the Analysis of Variance (ANOVA) on the Acceptability Level of PR2 Memory Lane Game based on Participants' Social Role*

Components	Social Role	Mean	SD	p-value (a=0.05)	Decision
Efficacy	Students Teachers IT Experts	4.50 4.97 4.47	0.52 0.08 0.73	0.21	Fail to reject the H0
Accuracy	Students Teachers IT Experts	4.70 4.93 4.63	0.39 0.16 0.67	0.47	Fail to reject the H0
Reliability	Students Teachers IT Experts	4.77 4.88 4.17	0.41 0.27 0.61	**0.04	Reject the H0
Security	Students Teachers IT Experts	4.80 4.70 4.27	0.39 0.40 0.42	0.10	Fail to reject the H0
User-friendliness	Students Teachers IT Experts	4.57 5.00 4.83	0.21 0.00 0.39	**<0.00	Reject the H0
Game Design	Students Teachers IT Experts	4.73 4.87 4.43	0.27 0.16 0.51	0.12	Fail to reject the H0
Engagement	Students Teachers IT Experts	4.72 4.93 4.57	0.63 0.10 0.43	0.35	Fail to reject the H0

The computed p-values for efficacy, accuracy, security, game design, and engagement surpass the alpha (0.05). The null hypothesis is failed to reject. There is no significant difference in the app's acceptability level based on the said components when participants were grouped according to their social role.

On the other hand, reliability's and user-friendliness's p-values are less than the alpha. The null hypothesis is rejected. There is a significant difference in the acceptability level of the app's reliability and user-friendliness assessed by three various groups.

This suggests that PR2 Memory Lane Game is equally accepted by the students, teachers, and IT experts in terms of efficacy, accuracy, security, game design, and engagement. However, they assessed it differently in terms of reliability and user-friendliness. Teachers rated its user-friendliness with perfect scores while IT experts gave it the lowest scores in reliability.

Table 9 displays the opinions of some of the participants about the most helpful and engaging app features of the PR 2 Memory Lane Game.

Table 9. *Participants' Insights on Most Helpful and Engaging App Features*

Participants	Insights
P2	The app has a lecture type part where students may review the lesson independently.
P3	The way the app provides relevant PR2 lessons. It really suited its goal to assist learners in reviewing PR2 lessons.
P8	It's minimalistic app display that is enough for visually impaired/phobic users.
P14	The app is smooth and has a straightforward interface makes the app ideal for students.

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P15	High Performance Users expect fast loading speeds and a glitch-free experience. Apps that are slow or drain battery life are often abandoned.

The table presents the positive sides that they enjoyed and appreciated while using the PR2 Memory Lane Game. Five (5) out of 18 participants pointed out that the lessons effectively support independent learning and knowledge acquisition. One participant (P2) appreciated the lecture-type format that allows users to have personalized pace in reviewing lessons. While another participant (P3) said that the content is highly relevant in its goal to assist learners in reviewing Practical Research 2 (PR2) lessons.

Moreover, there are six participants who expressed that the app possesses a smooth, straightforward, and visually pleasing interface and design. Participant 8 highlighted that it can accommodate users who are visually impaired. Another participant (P15) noted that a smooth and straightforward interface makes the app ideal for students.

In conclusion, the participants found the app to be neat, smooth, and accessible to those with visual impairments. The app features that are highly accepted are quizzes, time limits, sound effects, visuals, lesson contents, and performance. However, even though most agreed of those features being effective, it is said that time limits impose pressure on the users. But ultimately, the app has features that are helpful and engaging.

Table 10 shows the insight of some of the participants into how the PR 2 Memory Lane Game app can be improved.

Table 10. *Participants' Insights for the App's Improvement*

Participants	Insights
P2	The app has no security feature. It is better if the teacher can identify who played the game and what is their progress.
P4	The game can be improved by publishing it online and enhancing its security system. The construction of questions should also be improved by making them more specific and by providing additional questions (level of difficulty) based on Maslow hierarchy of needs.
P8	Questions must be phrased clearly to avoid confusion on the game's end.
P6	Provide questions that are in different degrees of abstractions. Maybe much better if the questions and answers were already aligned with the PISA & the SOLO framework.
P11	By providing the correct answer after answering

PR 2 Memory Lane Game App is accepted as helpful and engaging, especially its quizzes, visuals, sounds, and lesson content. However, some users felt that time limits caused pressure. Participants suggested improving the app by adding security features, making questions clearer and more varied, aligning them with learning frameworks, and showing correct answers after each question.

CONCLUSIONS

The purpose of this study was to evaluate the acceptability of PR 2 Memory Lane in terms of efficacy, accuracy, reliability, security, user-friendliness, game design, and engagement, considering the participants' sex and social role. Based on the findings, the following conclusions were drawn.

The overall results revealed that PR 2 Memory Lane is highly acceptable across all evaluated components. The application is found to be effective, accurate, reliable, secure, user-friendly, well-designed, and engaging as a gamified learning tool for Practical Research 2.

Furthermore, the findings showed that there is no significant difference in its acceptability level based on sex, indicating that both male and female participants share similar perceptions of the application. However, differences were observed when participants were grouped according to social role, particularly in terms of reliability and user-friendliness. This suggests that students, teachers, and IT experts have varying perspectives on these aspects of the application. The results confirm that PR 2 Memory Lane is a viable and effective alternative reviewer that supports the teaching and learning of Practical Research 2.

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RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are proposed.

1. To the Department of Education (DepEd), utilize PR 2 Memory Lane as an interactive teaching instrument to reinforce lessons, motivate students, and encourage active participation. It may also provide continuous feedback to further improve the content accuracy and usability of the game.
2. For the students, use the game application responsibly as a study supplement, not a replacement for formal instruction. Maximize its features to improve retention, comprehension, and confidence in Practical Research 2.
3. To game developers, improve the application in terms of the users' security. Improve users' experience and engagement. Also, they may add features such as history where one can see the records of the attempts and scores and develop more questions for different levels of difficulty. Also, they may add features such as user-history where one can see the records of the attempts and scores and develop more questions for different levels of difficulty.
4. To the future developers, conduct studies with a larger sample size and longer testing duration to validate and expand the findings. Explore the effects of PR 2 Memory Lane on actual academic performance, memory retention over time, and comparative effectiveness against traditional review methods. Consider adapting the game for other subjects or integrating advanced features such as analytics dashboards, adaptive difficulty levels, or collaborative modes.

Appendix

Figure 1 shows QR Code that can be used to access the PR2 Memory Lane Game. Figure 1. PR2 Memory Lane Game's QR Code.

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