EFFECT OF VIRTUAL ROLE-PLAYING GAMES ON STUDENTS' PERFORMANCE LEVEL IN ELECTRICAL INSTALLATION AND MAINTENANCE SUBJECT

Jovanne B. Tatoy[1] and Fernando T. Capilitan, Jr[2]
Department of Technical and Technology Education
University of Science and Technology of Southern Philippines, Republic of the Philippines
For Correspondence: Tel. +63 936 412 6426[1]
Email: jovanne.tatoy@deped.gov.ph[1] fernando.capilitan@ustp.edu.ph[2]

ABSTRACT: *High school students majoring in Electrical Installation and Maintenance often encounter cognitive challenges related to fundamental concepts, particularly in areas like measurement and calculation. These struggles were reflected in their performance, which tended to show mastery gaps. To address this, our study aimed to investigate the impact of Virtual Role-Playing Games (VRPG) on the performance level of grade 11 students in the Electrical Installation and Maintenance subject. We employed descriptive statistics, including weighted mean and standard deviation, to analyze participants' scores during both pretest and posttest assessments. Additionally, inferential statistics (specifically the t-test) were used to compare the differences between pre-test and post-test results. After implementing VRPG as an instructional tool, participants demonstrated average to good performance in the posttest. Notably, the degree of improvement between pre-test and post-test scores was highly significant. To delve deeper into the quantitative data, we conducted a conventional thematic analysis. This qualitative approach allowed us to explore participants' lived experiences with the instructional material. Two main themes emerged from this analysis: the acquisition of new knowledge and skills and self-paced learning development. Furthermore, our findings indicated that the VRPG was highly effective and user-friendly. As educators strived for effectiveness and efficiency in the teaching process, we recommended embracing technological advancements like VRPGs as instructional materials for teaching students.*

Key Words: Cognitive Skills, Effectiveness, Electrical Installation and Maintenance, Virtual Role-Playing Game

INTRODUCTION

The traditional teaching methodology was considered as the practical procedure in delivering knowledge and skills in learning. Teaching was extremely teacher-centered and the teacher dominated interaction in the classroom. This methodology placed the teacher in the full accountability for the teaching and learning process. The students who were present during the lesson will inherit the knowledge that the teacher discussed. In addition, using the conventional method, the teacher would write the locations of assignments, reviews, readings, advanced study materials, and exam pointers on the board and discuss them with the class [1].

In contemporary education, schools and institutions aim to improve the quality of teaching and learning processes to enhance students' performance. Currently, different educational methodologies are offered such as face-to-face learning, e-learning, blended learning, and online learning. Moreover, teachers experienced difficulties on what was the appropriate method that the learners preferred in the learning process to boost their academic performance [2].

The issues of the continuation of the educational process could be addressed through online and digital role-playing game learning [3]. The proof of educational games is still debatable, but they do allow educators to replicate real-life events in a secure setting without real-life consequences [4]. If a teacher wanted to make games in the classroom curriculum, they had some effort to do [5]. Videogames could be used to teach certain concepts in the curriculum, but they must be made in a way that preserves the core aspects of playing: the freedom to explore, the freedom to make mistakes, the flexibility to try new things, and the opportunity to develop one's personality [6].

A variety of video game genres might be used as a potential tool in teaching. One of the video game genres that he identified was the Role-Playing Game (RPG), it featured mystery and clear goals that the player must attain to pass to the next level. Players would explore the game by solving situations, interesting problems, and engaging in quests. In other words, RPGs allow students to undertake the role of a character in the game and to control the character based on the characterization [7].

This study would utilize Role-Playing Game (RPG) maker Mobile Version (MV) to create an educational role-playing game, which includes an original premade tile set, characters, and events ready to use in creating new games. One feature of the RPG maker MV was that the game developer could create and customize the game whatever they wanted. The fully created RPG could be distributed easily through media transfer using Bluetooth or Share-it and playable on personal computers or mobile devices.

Based on personal experiences, the researchers observed that several senior high school students taking up electrical installation and maintenance had struggles cognitively on basic concepts of common competency performing mensuration and calculation that reflected as least mastered in the previous students' performance. The majority of errors were made by students in electrical installation and maintenance because reading in particular was not important to them since they valued technical-vocational abilities over academics [8]. This was the reason why the researchers wanted to integrate games in the learning process to make the lesson more engaging since the learners now-a-days were exposed to personal computers and mobile gadgets.

This study investigated the effect of virtual role-playing games on students' performance level in electrical installation and maintenance in Tomas Cabili National High School located at Tomas Cabili, Iligan City, Lanao del Norte, Philippines. A teacher-made standardized test was utilized and developed using a table of specifications and item analysis. Students' performance levels would be assessed before and after the Role-Playing Game. It was administered through pre-test and post-test. In addition, an interview would be followed with the selected Electrical Installation and Maintenance (EIM) senior high school students in grade 11 on their lived experiences with the use of role-playing games. Thus, this study sought to answer the question: 1. Was there a significant difference in terms of pre-test and post-test among the respondents who were exposed to role-playing games (RPG)? 2. What were the lived experiences of the students exposed to a role-playing game (RPG) as an instructional intervention in learning Electrical Installation and Maintenance (EIM)?

METHODOLOGY

This study examined the effect of virtual role-playing games on students' performance level in electrical installation and maintenance in Tomas Cabili National High School senior high school students.

The explanatory mixed-method research design with a one-group pretest-posttest design was used in this study. Sequential explanatory design was preferred because the quantitative design used in the first stage that would reflect the overall objective statistical findings from the group [9]. Following that, a qualitative approach was used to elicit subjective details from participants as unique individuals and explain the phenomenon hidden in the numbers that cannot be fully explained by the quantitative data.

In this study, the researchers gave a pre-test and post-test to the set of participants before and after introducing them to a role-playing game in a particular task. Quantitative research was used by the researcher to collect and analyze the numerical data from the participants and a descriptive phenomenology design would aim to systematically describe the phenomenon of the data that would be gathered from the participants. Furthermore, descriptive statistics would summarize the given data to represent the entire population.

Moreover, the researchers selected nine of the respondents for the qualitative data to seek an in-depth understanding hidden in the numbers that cannot be fully explained by the quantitative data. A phenomenology research design would seek to understand and describe the lived experiences of the respondents. In addition, conventional thematic analysis would be used by the researchers to explore key themes in the data and how they related to one another.

The study was conducted at the Tomas Cabili National High School (TCNHS) located at Tomas Cabili, Iligan City, Lanao del Norte, Northern Mindanao, Philippines. In the aforementioned school, profiling, pre-tests, role-playing games, post-tests, and interviews would be administered. This study was very suitable in Tomas Cabili National High School since the school offers Technical Vocational and Livelihood (TVL) Track - Industrial Arts Strand with a specialization in Electrical Installation and Maintenance (EIM).

The participants of the study comprised grade 11 senior high school students taking Electrical Installation and Maintenance specialization at Tomas Cabili National High School (TCNHS), during the second-semester first period of the school year 2023–2024. Grade 11 EIM students were the target respondents in this study since they are the students who would be tackling the common competency of the migrated Electrical Installation and Maintenance (EIM) National Competency (NC) II training regulation, namely perform mensuration and calculation as a requirement to pass the assessment of Electrical Installation and Maintenance (EIM) National Competency (NC) II. 34 student participants were selected through a purposive sampling technique.

This study used purposive sampling in selecting the research respondents. The judgment sampling method, also known as purposive sampling, involves selecting participants specifically for their attributes. This nonrandom technique did not require underlying theories or a predetermined number of participants. Simply defined, the researchers chose what information was necessary to have and then searched for sources willing and able to supply data based on their knowledge or experience [10].

A decision was made regarding which instances should be chosen to provide the greatest information to answer the research's goal based on the researcher's understanding of the population. The following inclusion criteria guided the selection of the respondents: (a) they must be a registered student in Tomas Cabili National High School (TCNHS), and (b) they must have enrolled in Electrical Installation and Maintenance. For this study, the quantitative data would be the whole grade 11 class as the respondents, and for the qualitative data. the researchers chose nine (9) from the grade 11 students to represent the whole class respondents.

The research tool would utilize a teacher-made standardized test. The teacher-made standardized test was a multiple-item test that was developed through the table of specification and item analysis, which would measure the students' performance in performing mensuration and calculation competency through pre-test and post-test before and after implementing the role-playing game.

The research tool consisted of a 50-item test that was validated by an electrical expert. After the validation of the electrical expert, the research tool underwent pilot testing in 34 grade 12 students who were already finished taking the perform mensuration and calculation competency. Afterward, the research tool underwent item analysis that trims down the 50-item test to 25-item tests. The 25-item test research tool was faced validated by a professional reader expert for proper grammar. In addition, the researchers would conduct interviews based on the lived experiences of the students exposed to role-playing games as instructional material in learning the basic concepts of common competency to perform mensuration and calculation.

The researchers used descriptive statistics for research question 1 to describe the students' performance using mean and standard deviation. Additionally, the researchers used inferential statistics to ascertain whether there was a statistically significant difference between the participants' pre-test and post-test scores using a t-test.

For research question number 2, the researchers would utilize the conventional thematic analysis. Interpretative phenomenology analysis was utilized to analyze the qualitative data. After completing the role-playing game, the researchers would conduct interviews with the selected nine (9) respondents. Giving comprehensive consideration to each participant's story (case) was the primary goal of interpretative phenomenological analysis (IPA). Due to the small sample sizes in IPA investigations, a thorough and time-consuming case-by-case examination is possible. Early on, the researchers must choose whether to deliver a broader account of a group or particular population or to give a thorough examination of a particular participant's experiences. There was no restriction on the minimum or maximum number of participants. Typically, it depends on: 1. the scope of a single case study's analysis; 2. the depth of the specific cases; 3. how the researchers wished to contrast or compare individual situations; 4. the practical constraints one was operating under [11].

RESULTS AND DISCUSSION

One sample T-test was performed to test the significant difference in the mean scores between the pre-test and post-test among the respondents who were exposed to role-playing games as an instructional intervention in learning EIM. The results from the pre-test ($M = 11.06$, $SD = 4.41$) and post-test ($M = 18.41$, $SD = 4.72$) revealed that the instructional materials as intervention t (33) = 19.03, were significantly different ($p<.001$) as indicated in Table 1. This meant that the respondents dramatically improved their learning level after the implementation of the RPG as an instructional intervention in learning EIM among the respondents.

Table 1-Mean, SD, and significant difference between pre-test and post-test of the respondents who were exposed to Role Playing Game RPG (n= 34)

	Mean	SD	t-value	df	p-value	Remarks
Pre-test	11.06	4.41	14.62			
				33	p<0.01	Supported
Post-test	18.41	4.72	19.03			

Proper implementation and utilization of the role-playing game contributed a lot to increasing the cognitive skills of grade 11 electrical installation and maintenance students in performing mensuration and calculation. The RPG-based assessment's content was more engaging and fascinating, and it allowed for the creation of a dynamic learning environment with the use of sound, animation, and interaction. Students were able to actively engage in learning in this way, which decreased their anxiety about learning and increased their willingness to learn, both of which improved their academic performance [12].

The participants' understanding of vocabulary improved significantly when they used the computer role-playing game. This popular media helped teachers meet learning objectives and provided students with a great deal of excitement while they learned. The computer role-playing game created a happy atmosphere and a meaningful experience that encouraged students to learn in the classroom. Teachers also found these media useful because they were effective and simple to use, especially when it came to inspiring students [13].

A role-playing game could boost participation and turn the planned lesson into a more authentic, hands-on educational experience. This method could help defuse awkward situations with challenging subjects by using a more lighthearted pedagogy while maintaining the intended meaning. Furthermore, the role-playing game elements incentivized players to explore other strategies that they might not have initially thought of, while also highlighting the importance of adapting to a changing environment. Lastly, role-playing games could be greatly altered to suit a variety of instructional objectives [14].

The findings presented in this section sought to answer the second research question of this study: What were the lived experiences of the students exposed to role-playing games (RPG) as an instructional intervention in learning Electrical Installation and Maintenance (EIM)? Personal interviews were done to collect the data to provide an in-depth understanding of the role-playing game as an instructional intervention in learning electrical installation and maintenance. An interpretative phenomenology analysis approach was employed in the thematic analysis of the data from nine personal interviews conducted.

Following the interpretative phenomenology analysis approach, two main themes emerged in the data analysis. These two main themes were labeled (a) Acquisition of new knowledge, and (b) Developed self-paced learning. Presented in Table 2 were the codes, categories, and emerging themes.

Table 2-Themes that emerged from the personal interview of the lived experiences of the students exposed to Role Playing Games (RPG) as an instructional intervention in learning Electrical Installation and Maintenance (EIM).

Code	Categories	Emerging Themes
Easy to understand / It gives discussion every learning outcome. / It has multi-function features / Can enhance the competency	Multiple Functionalities	Acquisition of new knowledge and skills
It is enjoyed while learning	Motivates Learning	Developed self-paced learning
Suitable for mastering the lesson	Application of Learning	
Suitable to use in android phone	Convenient to use	

The acquisition of new knowledge and skills had a category of multiple functionalities and was supported by 4 statements. During the personal interviews, respondents shared their lived experiences and how the role-playing game helped them achieve the ultimate goal of performing mensuration and calculation competency. It was a multi-function that gave discussion of every learning outcome for easy understanding that could enhance the competency of a student.

The role-playing game featured a discussion and lesson on how to use a measuring instrument. According to respondent number 1, *"I like RPG because I learned how to use measuring instruments"*. Respondent number 8 said, *"It teaches me how to use a multi-tester properly and calculate the given problems"*. This was also confirmed by respondent number 5, *"I learn the different symbols in electrical installation and maintenance, how to use the ammeter and ohmmeter, and how to clean, maintain and store electrical instruments"*. Also, respondent number 4 said that *"There is a discussion before the question that I can able to answer"*.

The constructed role-playing game was taught to be an instructional technique that involved students in the process of thinking, creating new meanings, knowing, and acting [15]. Role-playing games gave students the ability to design their own customized learning settings. To achieve their objectives, players must choose the resources that best fit their needs. To advance in the game, players must plan and stay current with the dynamic RPG environment [16].

The role-playing game that this study utilized helped the students to acquire new knowledge and skills in performing mensuration and calculation competency by simply following the discussion and lesson. Because of this, the students could now able to answer the assessment or evaluation that the role-playing game had.

The Developed Self-Paced Learning had three categories: the motivates learning, application of learning, and convenience to use, and were further supported by 5 statements. During the personal interviews, respondents shared their thoughts that the role-playing game was a knowledgeable game that gave enjoyment, convenience, and interest while learning. It could also be used in offline and had a feature of trial and error while dealing with the assessment or evaluation.

According to respondent number 2, *"It is a knowledgeable video game that has a question and answers"*. This was also confirmed by respondent number 6, *"It is a knowledgeable game that caught my interest way back in the pandemic that I used to play the mobile game always"*. Also, respondent number 3 said that *"I am happy and enjoying the game while learning the perform mensuration and calculation competency"*.

According to respondent number 9, *"It was good and fun, and I have learned a lot about the topic which has a quiz that tested my knowledge about the topic"*. This was also confirmed by respondent number 7, *"I experienced failure when I answered the question wrong, and correct my answer by using the right formula of mensuration and calculation"*.

Engaging in role-playing games (RPGs) could facilitate self-discovery, interest growth, and skill enhancement for players [17]. The topics that participants were most interested in learning more about were synchronicity and serendipity, shared sentiments and the group's imagination, empathy and distancing skills, and personal and group development. With this, teachers noted that role-playing games (RPGs) provided an interesting narrative for students to learn within, leading to an increase in self-efficacy and an increase in motivation and engagement [18].

The role-playing game that this study utilized helped the students develop self-paced learning in performing mensuration and calculation competency. It was self-paced learning because the role-playing game featured discussion and video lessons that were convenient to access through an Android phone and motivated the students to apply their learning in real life.

CONCLUSION
The study aimed to determine the significant difference in terms of pre-test and post-test among the respondents who were exposed to role-playing games (RPG), especially of their prior knowledge in performed mensuration and calculation competency in electrical installation and maintenance. Also, the study sought to discover how role-playing games helped the grade 11 electrical installation and maintenance students improve their performance levels. The conclusions were drawn based on the study's major discoveries: (1) The grade 11 electrical installation and maintenance students dramatically improved their cognitive skills after the implementation of the role-playing game, and (2) The grade 11 electrical installation and maintenance students acquired new learnings which they applied in performing mensuration and calculation.

Based on the results presented in the previous chapter, the study revealed that the grade 11 electrical installation and maintenance students exhibited mastery of performing mensuration and calculation competency when there was an increase in their scores after implementing the role-playing game. There was a huge difference in scores on their paper and pen tests, and at the same time, they performed excellently in mensuration and calculation. Therefore, the H1 research hypothesis which stated that there was a significant difference in the mean scores between the pre-test and post-test in terms of implementation of the role-playing game (RPG), was accepted, and the H0 null hypothesis was rejected.

It was also expected that participants would learn something new after the implementation of a role-playing game, whether it would directly or indirectly affect them personally and professionally. The results during the interview unfolded how the role-playing game helped the grade 11 electrical installation and maintenance students perform mensuration and calculation in real life. Most participants appreciated and expressed how it gave them new learnings and how these would benefit them as future electrical practitioners.

The role-playing game implemented was a success for the researchers and the grade 11 electrical installation and maintenance students since the results for cognitive skills were conclusive. The conceptualization of the role-playing game would not be realized without the help of a role-playing game expert. Since the role-playing game was cognitively content, the conceptualization was the result of the researcher's experience and dream of developing an instructional intervention in performed mensuration and calculation competency. It was important to note that a role-playing game would be more effective if reinforced with face-to-face classes.

RECOMMENDATION
The study focused on the effect of virtual role-playing games on students' performance levels in electrical installation and maintenance. The results provided empirical data about improvements in cognitive skills of the grade 11 electrical installation and maintenance students after the implementation of the role-playing game and how the role-playing game helped them to perform mensuration and calculation in electrical installation and maintenance. As a result of the study's discoveries and conclusions, the researcher formulated the following recommendations:

For educators to be effective and efficient in the teaching-learning process, government organizations (DepEd, CHED, and TESDA) should push their instructors and trainers to embrace technology advancements. Role-playing games could help students perform better in the modern classroom; hence they should be encouraged to be improved. The school would benefit from this improvement in terms of accreditation, recognition, and potential for becoming a leader in the use of game-based learning materials in the classroom. Given that role-playing games could be downloaded onto Android phones, they ought to take into account how convenient they were to use.

Since technology was always evolving, educators and trainers themselves needed to be updated on the latest developments. They would be able to learn more effectively and efficiently as a result. They were supportive of innovative ideas that could be aided in the learning of electrical installation and

maintenance. One of the functions that role-playing games played in education was helping instructors and trainers facilitate learning.

Students who were exposed to the utilization of this role-playing game would benefit from it. However since students would be using the role-playing game at their own pace, they should cultivate in themselves the attitude of self-paced learning. Students preparing for grade 11 electrical installation and maintenance would benefit from the role-playing game. Playing this role-playing game would undoubtedly help them learn how to make calculations and measure more accurately. Their ability to perform better would enable them to hold an NC 2 certification and anything associated with it. When students graduate from senior high school, this would also be useful to them.

The findings of this study could be used by future researchers to examine problems and concerns in electrical installation and maintenance training in greater detail. The study's findings could be used as a standard by future researchers to improve student performance.

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