ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Web-Based Learning Resources and Problem-Solving Skills of Grade 9 Students

Maryrose I. Pastores*[1], Allen E. Pasia[2]
[1] Dr. Maria D. Pastrana National High School, Mauban, Quezon, Philippines
[2] Laguna State Polytechnic University, San Pablo City, Philippines
*Corresponding Author email: maryrosei.pastores@deped.gov.ph

Received: 22 June 2023 **Revised**: 04 August 2023 **Accepted**: 08 August 2023

Available Online: 24 August 2023

Volume II (2023), Issue 3, P-ISSN – 2984-7567; E-ISSN - 2945-3577

Abstract

Aim: This study determined the perceptions in the use of Web-Based Learning Resources and its correlation to problem-solving skills, and to identify the difference between the pretest and posttest scores in the problem-solving skills of Grade 9 students.
Methodology: This research utilized survey research of quantitative approach to determine the perceptions of the students in the usability of Web-Based Learning Resources designed by the researchers in terms of technical and pedagogical. Moreover, the researchers utilized experimental research to determine the scores of the respondents before and after implementing the Web-Based Learning Resources in the Problem-Solving Skills and employed purposive sampling technique to determine the 30 grade 9 students in a public school in Mauban, Quezon who had a gadget as a tool in the teaching process. Frequency, Percentage, Mean, Standard Deviation, Pearson Product-Moment Correlation, and t-test were all utilized to comprehensive and statistically analyze the data.
Results: The findings indicate that students found WBLR to be usable in both technical and pedagogical aspects. Additionally, the implementation of Web-Based Learning Resources in problem-solving skills resulted in an improvement in student scores. Research found the positive correlation between the perception in the use of WBLR, and problem-solving skills highlights the importance of creating a positive learning environment and designing WBLR effectively. A significant value of 0.000 in all the mathematical problem-solving skills when tested at 0.05 level of significance reveals a significant difference before and after using the Web-Based Learning Resources.
Conclusion: There is a significant relationship between the perceptions in the use of Web-Based Learning Resources and Problem-Solving Skills. Also, there is a significant difference between the Problem-Solving Skills of the students before and after using the Web-Based Learning Resources.

Keywords: *Web-Based Learning Resources, problem-solving skills, technical usability, pedagogical usability*

INTRODUCTION

In K-12 education, student performances are connected to their achievements in higher education and eventually as professionals (Khattab, 2015). The most significant factor in economic competitiveness is education and a successful education system promotes the success of its nation, especially evidenced throughout the twentieth century. Education in the 21st Century has been and is being profoundly influenced by technical and globalization (Voogt et al., 2013). An integrated curriculum is one of the effective ways to resolve some challenges associated with developing 21st -century skills (Drake & Savage, 2016). The educational system has been changing by the world's outstandingly developing technical (Kaya et al., 2012).

The teaching-learning approaches are one of the significant ways for educators to implement the curriculum principles. One of the learning technologies that can be used is web-based learning, which is increasing rapidly nowadays (Gosper et al., 2016). So that web-based learning can run in accordance with what is expected to provide effectiveness and efficiency in the learning process. The teaching world is modified due to rapid changes in educational technology.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

According to Simon (2015), by leveraging the instructional potential of web-based learning resources, you can increase student's engagement, expose them to authentic content, and engage them in collaborative activities that trigger critical thinking and creativity. The web contains lots of pedagogical information on a variety of topics that can be used to improve teaching (Chakraborty et al., 2012). They can provide teachers and students with a variety of new and exciting opportunities that would not be possible in a traditional classroom (Hadjerrouit, 2010).

Efforts to enhance mathematical problem-solving involve using smartphone media as a valuable learning resource. Several free applications, such as Edmodo, Socrative, Kahoot, Quizizz, Google Classroom, Flubaroo, and Edpuzzle, can be effectively employed. Notably, game-based learning stands out as a significant innovation within technical advancements, offering promising opportunities for improving mathematical problem-solving abilities (adapted from Wang & Tahir, 2020).

According to Kumar and Sharma (2021), The utilization of students' habitual use of digital platforms offers a promising avenue to enhance traditional teaching strategies. By implementing a designed digital learning environment, students can engage in learning activities that cater to their preferences regarding time, location, and pace (Panergayo & Aliazas, 2021).

The mathematics curriculum in the K to 12 Basic Education has two objectives: critical thinking and problem solving (Department of Education, 2016). The purpose of the curriculum embeds with the skills, processes, values, and attitudes of Filipino learners that were given a great deal of consideration during its inception.

Given the attention that the Philippine education system is dedicating to Mathematics, there are still various issues and difficulties arising in teaching and learning the subject. This agrees with the statement made by Alkan (2013) who said that ever since the introduction of mathematics in the curriculum, mathematics has always been viewed as a problem area for pupils.

Among the many issues and concerns related to Mathematics teaching and learning, the most common are the problem-solving performance of students and the math anxiety level of students. Problem solving plays an important role in mathematics and has a prominent role in the mathematics education of K-12 students, but mathematics teachers are oblivious in incorporating meaningful problem solving into their classroom teaching (National Council of Teacher of Mathematics, 2010).

Many studies conduct the perception of teachers and students about the use of Web-based learning resources at the tertiary level (Nordin & Alias, 2013; Gautam et al., 2020). So far none in K-12 students, however, this study aims to know the perceived level of students in the use of Web-Based Learning Resources, and relationship between the perceived level of students in the use of Web-Based Learning Resources and Problem-Solving Skills, and Problem-Solving Skills. Since online learning is new in Department of Education and students are experiencing the blended learning, this study will serve as a guide for a teacher to know the perception of the students to the use of WBLR and find a problem that needed to improve in the use of technical and pedagogical. Also, these learning resources will serve as a reviewer to the students wherever they are, may it be in other places not only at home. The material has lessons, video tutorial, figures, illustrations, and more that focuses on the steps developed by Polya.

Despite the importance of Mathematics, studies revealed an alarming performance in the Philippine schools in terms of Science and Mathematics both in the national and international. According to a global survey, the Philippines ranked 115th out of 142 countries in evaluated quality of Math and Science education. The World Economic Forum's Global Competitiveness Report for 2011-2012 provided the basis for these statistics. The Philippines ranked lowest among 10 countries even with only the science high schools participating in the Advanced Mathematics category in 2008 (Jalmasco, 2014).

In Mauban, Quezon, particularly in Dr. Maria D. Pastrana National High School, the low performance of students in Mathematics was observed. Students were not able to cope with their daily lessons. As a result, they are having a hard time applying what they have learned in their daily life. And because of that, during the performance tasks,

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

particularly in Mathematical Problem-Solving, they face difficulties that would possibly result in a poor grade. For the last three years, the average range of Mean percentage Score (MPS) of Grade 9 students was 45-55%.

Hadjerrouit (2010) suggested a model of evaluating the usability of web-based learning resources which constitute an important dimension, namely technical, and pedagogical. The goal of the use of technical is to minimize the cognitive load resulting from interaction with the software to free more resources for the learning process itself. Pedagogical focuses on matters relating to aims and objectives, approach to design, organization, delivery strategies and methods, and medium of Web-based learning resources.

There are various techniques in problem-solving, one of which is the Polya step. Basically, problem-solving refers to the four steps of problem-solving as established by Polya, which include understanding the problem, constructing a plan, executing the plan, and re-examining the answer. Polya (1962) defined problem solving as a process "… to search consciously for some action appropriate to attain a clearly conceived, but not immediately attainable aim" (p. 698).

In this study, the researchers aimed to determine the students' perception in the use of Web-Based Learning Resources in terms of technical and pedagogical. To provide a strong theoretical basis for the research, the researchers adapted the survey questions by Said Hadjerrouit (2010). This theory was mostly utilized at tertiary level, but the researcher was motivated to implement the WBLR in high school level. The researcher wanted to determine the effect of using the WBLR in the problem-solving skills of the student which was developed by Polya (1973).

Research Questions

This study intended to determine the use of Web-based Learning Resources and the problem-solving skills of Grade 9 students. Thus, the study sought to give answers to the following questions.

1. How do the respondents perceive the use of Web-Based Learning Resources in terms of:
   1.1 technical; and
   1.2 pedagogical?
2. What are the scores of the students before implementing Web-Based Learning Resources in the problem-solving skills as to:
   2.1 understanding the problem;
   2.2 constructing a plan;
   2.3 executing the plan; and
   2.4 re-examining the answer?
3. What are the scores of the students after implementing Web-Based Learning Resources in the problem-solving skills as to:
   3.1 understanding the problem;
   3.2 constructing a plan;
   3.3 executing the plan; and
   3.4 re-examining the answer?
4. Is there a significant relationship between the perception in the use of Web-Based Learning Resources and Problem-Solving Skills?
5. Is there a significant difference between the Problem-Solving Skills of the students before and after using the Web-Based Learning Resources.

Hypothesis

Based on the problems formulated, the null hypotheses were tested on 0.05 level of significance:
Hypothesis 1: There is no significant relationship between the perception in the use of Web-Based Learning Resources and Problem-Solving Skills.
Hypothesis 2: There is no significant difference between the Problem-Solving Skills of the students before and after using the Web-Based Learning Resources.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ETCOR REVIEW CENTER
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

METHODS

Research Design

This research utilized survey research of quantitative approach to determine the perception of the students in the usability of Web-Based Learning Resources designed by the researcher in terms of technical and pedagogical. Moreover, the researcher utilized experimental research to determine the scores of the respondents before and after implementing the Web-Based Learning Resources in the Problem-Solving Skills.

Population and Sampling

The researchers employed a purposive sampling technique to determine the 30 grade 9 students in a public school in Mauban, Quezon who had a gadget as a tool in the teaching process as a significant source in accessing the web. The experiment was conducted within four weeks during the Third Quarter of the school year 2022-2023. Furthermore, the respondents of the study are from heterogenous group which consists of high, middle, and low performing students.

Instrument

The researchers adapted a 15-survey question that focuses on terms of technical and pedagogical about the use of Web-Based Learning Resources and this was the study of Said Hadjerrouit (2010). Moreover, the researchers formulated a Problem-Solving Test, and it is composed of 4 questions with guide questions that focus on the problem-solving skills developed by Polya. The questions are based on the Curriculum Guide (2015) and Learner's Packet (LeaP), 2020, presented by the Department of Education and the researcher used a rubric for scoring.

The test questions were validated by the Master teacher of the Mathematics Department based on the criteria prepared by the researchers, while an expert checked the survey questions. Additionally, the web resources that needed to be utilized as instructional materials in teaching were validated by an ICT expert, a content expert in Mathematics, and a language expert.

Data Collection

The collected data from surveys and tests underwent a comprehensive examination and analysis aligned with the study's objectives and adhering strictly to research protocols. Every precaution was taken to ensure the ethical conduct of the research.

Treatment of Data

The frequency, percentage score, mean, and standard deviation were used determine the students' perception in the use of Web-Based Learning Resources and scores of the students before and after using the implementation, the Pearson Product-Moment Correlation was used to determine the significant relationship between the perception in the use of Web-Based Learning Resources and Problem-Solving Skills, and the t-test was used to determine the significant difference between the Problem-Solving Skills of the students before and after using the Web-Based Learning Resources.

Ethical Considerations

The researchers diligently adhered to ethical research protocols, prioritizing the rights and well-being of all individuals and institutions involved. This commitment was motivated by the responsibility to protect participants and stakeholders, upholding the principles of ethical research, and fostering trust and integrity.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ETCOR REVIEW CENTER
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

RESULTS and DISCUSSION

The students' perception to the use of Web-Based Learning Resources

Table 1
The Perception of the Respondents on the Web-Based Learning Resources in terms of Technical Usability

Statement	MEAN	SD	VI
1. WBLR is easy to use.	3.43	.504	Agree
2. Symbols, logos, figures, pictures, and illustrations are easy to understand.	3.33	.479	Agree
3. Icons, and graphics are easy to use and browse through WBLR.	3.30	.702	Agree
OVERALL	**3.36**	**.56**	**Agree**

Legend: 1.0-1.49 (Strong Disagree); 1.50-2.49 (Disagree); 2.50-3.49 (Agree); 3.50-4.0 (Strongly Agree)

Table 1 indicates the perception of the respondents on the use of Web-Based Learning Resources in terms of Technical. The overall mean is 3.36 that interpreted as agree. The data indicates that most of the students agree with the usability of WBLRs in terms of technical.

The researcher used the Padlet as the WBLRs. In statement 1, students strongly agree (43.3%) and agree (56.7%) that they can easily use the platform. This indicates that most of the students find the platform to be user-friendly and have no significant difficulties in utilizing it.

In the initial week of conducting experiments with the WBLR, a significant proportion of the student participants displayed hesitancy primarily due to their limited familiarity with the platform. Nevertheless, after the passage of one week, they took the initiative to proactively inquire with the teacher about the utilization of the platform.

For statement 2, students strongly agree (33.3%) and agree (66.7%) that the symbols, figures, and illustrations are easy to understand. This finding highlights the significance of visual elements in instructional materials.

During the lesson introduction, interactive games were utilized to showcase the utilization of figures and illustrations, recognizing that numerous mathematical concepts involve visual representations and symbols. The utilization of these games within the Web-Based Learning Resources (WBLR) resonated positively with the students, motivating them to aspire for top scores or strive for the highest ranking during the learning activities.

Lastly, in statement 3, the students strongly agree (43.3%), agree (43.3%), and disagree (13.3%) that the WBLR is easy to browse, to navigate, and links for videos, games, and activity are easy to access.

Throughout the four-week duration of utilizing the Web-Based Learning Resources (WBLRs), the students made extensive use of the available resources. Many students were able to navigate the Padlet platform, able to access the links videos from You Tube, and able to play the given activity. However, some users encountered challenges, particularly when their gadgets/devices experienced lag or performance issues.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Table 2

The Perception of the Respondents on the Web-Based Learning Resources in terms of Pedagogical Usability

Statement	MEAN	SD	VI
4. The content of the WBLR is easy to understand.	3.33	.480	Agree
5. WBLRs are more useful than textbooks in learning the subject matter.	2.67	.557	Agree
6. WBLR helps me a lot in my studies.	3.20	.484	Agree
7. WBLR takes less time than textbooks in learning the subject matter.	2.80	.664	Agree
8. The task-based activities of the WBLR are interactive, exciting, instructive, and informative.	3.40	.498	Agree
9. Animations, graphics, and pictures provide support for understanding the subject matter.	3.37	.556	Agree
10. The WBLR is exciting to use, motivating, and interesting.	3.10	.481	Agree
11. The WBLR is adapted to my age, development, and interests.	3.07	.450	Agree
12. The WBLR provides different levels of difficulty and can be easily adapted to all students.	3.17	.531	Agree
13. WBLR does not require teacher's assistance in learning the subject matter.	2.27	.691	Disagree
14. WBLR encourages me to collaborate with my fellow students.	3.37	.490	Agree
15. Textbooks use is required in using WBLR.	2.90	.607	Agree
OVERALL	**3.05**	**0.54**	**Agree**

Legend: 1.0-1.49 (Strong Disagree); 1.50-2.49 (Disagree); 2.50-3.49 (Agree); 3.50-4.0 (Strongly Agree)

Table 2 indicates the perception of the respondents on the use of Web-Based Learning Resources in terms of Pedagogical. The overall mean is 3.05 which is interpreted as agree. It indicates that the respondents generally hold a positive view of WBLRs in terms of their pedagogical usability.

In statement 4, students strongly agree (33.3%), and agree (66.7%) that the content like videos from YouTube, activity, and games made by teacher are easy to understand. The use of videos, activities, and games can enhance the learning experience and make the content more accessible and engaging for the students.

Since students are not familiar with Quizizz, Kahoot, and Google Form, they tend to have many questions on how to utilize the apps, and to address their concerns and ensure proper understanding, the teacher provided detailed explanations and instructions on how to utilize these apps. As time went on, the experiment last for a month, the students gradually became accustomed to using Quizizz, Kahoot, and Google Form. Through repeated practice and exposure, they likely gained confidence in their ability to navigate and utilize these apps independently. Also, the video lessons are chosen by the teacher and made sure that it is aligned to DepEd Melcs.

In statement 5, students strongly agree (3.3%), agree (60%), and disagree (36.7%) that WBLR is more useful than textbooks. Despite the advancements in technology and the availability of digital resources, students are more comfortable and inclined towards traditional learning methods, specifically reading through textbooks.

In statement 6, students strongly agree (23.3%), agree (73.3%), and disagree (3.3%) that WBLR helps them in the study. The data indicates that the WBLR is widely recognized and appreciated by most of the students as a valuable tool for supporting their studies.

In statement 7, students strongly agree (13.3%), agree (53.3%), and disagree (33.3%) that WBLR takes less time than textbooks in learning the subject matter. For students who disagree, it is possible that they may have different learning preferences or experiences that lead them to believe that textbooks are more efficient for their learning needs. Overall, the data highlights the diverse perspectives among students regarding the time-saving aspect of WBLR. While a majority agrees with the statement, a significant minority disagrees.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

In statement 8, students strongly agree (40%), and agree (60%) that the task-based activities are interactive, exciting, instructive, and informative. The positive response indicates that the design and implementation of the task-based activities within the WBLR effectively captures the students' attention, foster their active participation, provide valuable instruction, and impart meaningful information. Students perceive these activities as beneficial elements that contribute to an engaging and effective learning experience.

In statement 9, students strongly agree (40%), agree (60%) that the animations, graphics, and pictures provide support for understanding the subject matter.

The Padlet platform offers customization options that allow users, particularly account owners like teachers, to modify its appearance according to their preferences and design choices. Users can personalize the settings to create a visually appealing and engaging learning environment. Padlet ensures that the text displayed on the platform is readable and legible. Users can adjust the font size, style, and color to enhance readability and ensure that information is easily accessible to students.

In statement 10, students strongly agree (16.7%), agree (76.7%), and disagree (6.7%) that the WBLR is exciting to use, motivating, and interesting. For students who disagree, it is possible that these students have different preferences or experiences that influence their perception of the WBLR.

In statement 11, students strongly agree (13.3%), agree (80%), and disagree (6.7%) that WBLR is adaptable to the age, development, and interest. In today's digital age, students have a strong affinity for technology, and they often find excitement in using their cellphones. This familiarity with technology creates an opportunity for educators to integrate Web-Based Learning Resources (WBLR) into their teaching methods.

In statement 12, students strongly agree (23.3%), agree (70%), and disagree (6.7%) that WBLR provides different levels of difficulty and can be easily adapted.

During the four-week implementation of Web-Based Learning Resources (WBLR), a range of resources, including Google Forms, were utilized. While some students initially faced difficulties with Google Forms, particularly the issue of accidentally refreshing the page and losing their progress, they gradually became more familiar with the platform. As they gained experience and understanding, students were able to use Google Forms more effectively and navigate it without encountering significant challenges. At some point, students expressed a preference for the Quizziz app because it offers a wide range of presentations and activities beyond those prepared by the teacher.

In statement 13, students strongly agree (3.3%), agree (30%), disagree (56.7%), and strongly disagree (10%) that WBLR does not require teacher's assistance in learning the subject matter.

During the implementation period, the students frequently seek my attention to ensure they are using the Web-Based Learning Resources (WBLR) correctly and to confirm whether they have made any mistakes. Their desire for clarification and reassurance demonstrates their commitment to learning and their motivation to utilize the resources effectively.

In statement 14, students strongly agree (36.7%), and agree (63.3%), that WBLR encourages to collaborate with other classmates. They recognize the interactive nature of the WBLR, which facilitates communication, cooperation, and teamwork among students. The emphasis on collaborative learning reflects the importance of social interaction and cooperation in the learning process.

In statement 15, students strongly agree (13.3%), agree (63.3%), and disagree (23.3%) that textbooks use is required in using WBLR. Most of the students believe that textbooks complement online resources and serve as a supplementary learning tool. For the students who disagree, they may consider the online resources to be comprehensive enough on their own and do not see the need for additional textbook support.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ETCOR REVIEW CENTER
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Table 3

The Scores of the students before implementing Web-Based Learning Resources in the Problem-Solving Skills

MEAN SCORES	Understanding the problem		Constructing a plan		Executing the plan		Re-examining the answer		INTERPRETATION
	f	%	f	%	f	%	f	%	
2.01 – 3.00	22	73.3	0	0.0	0	0.0	0	0.0	Exemplary
1.01 – 2.00	8	26.7	3	10.0	0	0.0	0	0.0	Proficient
0.01 -1.00	0	0.0	27	90.0	14	46.7	3	10.0	Developing
0	0	0.0	0	0.0	16	53.3	27	90.0	Beginning
TOTAL	30	100	30	100	30	100	30	100	

Legend: 0 = Beginning; 0.01-1.00=Developing; 1.01-2.00=Proficient; 2.01-3.00 Exemplary

Table 3 are the mean scores of the respondents before implementing the Web-Based Learning Resources in the Problem-Solving Skills. In terms of understanding the problem, the results indicate that a significant proportion of the students displayed a high level of competency in understanding the problem before the introduction of Web-Based Learning Resources. In terms of constructing a plan, the findings indicate that before the use of WBLRs in the pretest, most of the respondents had difficulty in constructing a plan. In terms of executing the plan, the results indicate that they were still in the process of acquiring knowledge and skills. In terms of re-examining the answer, the findings indicate a lack of understanding of how to approach and solve the problem.

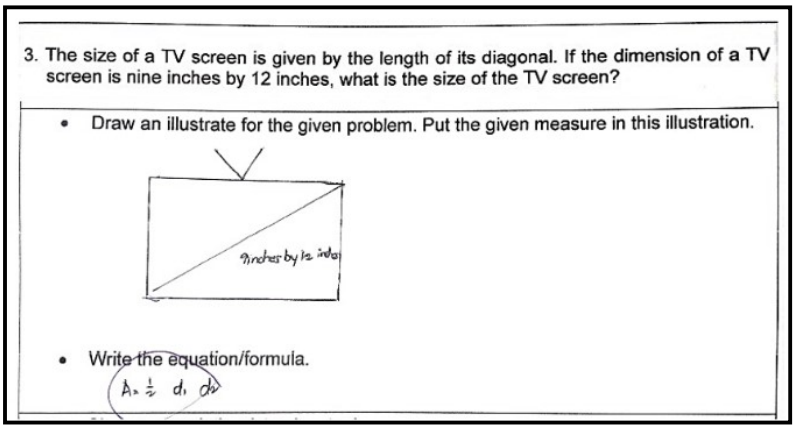

Figure 1. *Student A's answer in terms of Constructing a Plan*

Figure 1 shows an example of the student's answer in the pretest exam at one of the highest percentages, indicating that it is at the developing level. The students were able to provide an illustration, but it contained a mistake, and some parts were unlabeled. Additionally, the formula or equation used by the student was completely incorrect. The illustration lacked labels for each part of the triangle, including the two legs and the hypotenuse. The student erroneously applied the formula for solving the area of a kite, which is not applicable in the problem.

The correct formula to use in the given problem would be the Pythagorean Theorem, represented by $a^2+b^2=c^2$, and the theorem applies specifically to right triangles. The missing part of the triangle, the hypotenuse or the longest side is what needs to be determined using this formula.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Table 4

The scores of the students after implementing Web-Based Learning Resources in the Problem-Solving Skills

MEAN SCORES	Understanding the problem		Constructing a plan		Executing the plan		Re-examining the answer		INTERPRETATION
	f	%	f	%	f	%	f	%	
2.01 – 3.00	29	96.7	19	63.3	12	40.0	7	23.3	Exemplary
1.01 – 2.00	1	3.3	11	36.7	15	50.0	6	20.0	Proficient
0.01 -1.00	0	0.0	0	0.0	3	10.0	9	30.0	Developing
0	0	0.0	0	0.0	0	0.0	8	26.7	Beginning
TOTAL	30	100	30	100	30	100	30	100	

Legend: 0 = Beginning; 0.01-1.00=Developing; 1.01-2.00=Proficient; 2.01-3.00 Exemplary

Table 4 are the mean scores of the respondents after implementing the Web-Based Learning Resources in the Problem-Solving Skills. In terms of understanding the problem, the findings strongly indicate that the implementation of WBLRs has positively impacted the respondents' ability to understand problem-solving tasks. In terms of constructing a plan, the results indicate a strong improvement in their ability to formulate well-structured and effective plans. In terms of executing the plan, the results indicate that most of the students are well-prepared and capable of effectively execute the plan in the problem. In terms of re-examining the answer, the findings indicate that after the implementation of WBLR, most of the students demonstrated an improvement compared to the pretest scores.

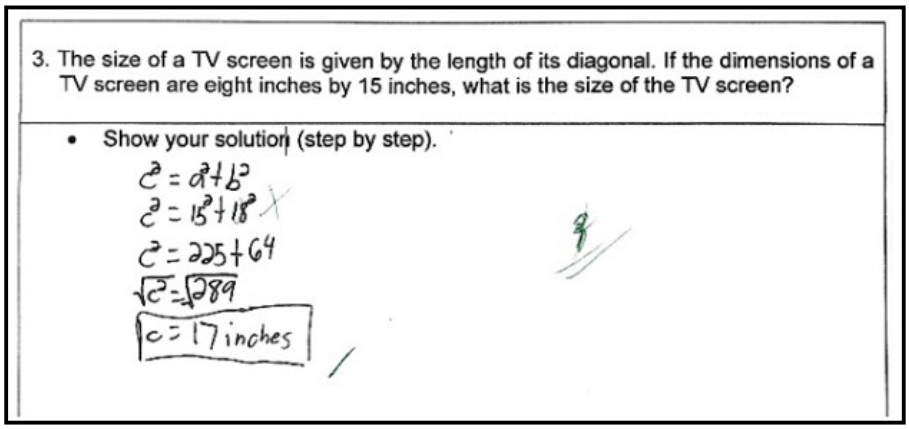

Figure 2. *Student B's answer in terms of Executing the Plan*

Figure 2 shows an example of the student's answer in the posttest exam where most of the students demonstrated significant improvement compared to the pretest exam. Upon the implementation of WBLR, students were at proficiency level. Examining the provided figure reveals that the student calculations were mostly accurate, even with a minor error. Specifically, the student mistakenly wrote "18" instead of the correct value of "8" for one of the legs (b) in the formula $c^2=a^2+b^2$. However, despite this error, the student managed to compute the result correctly as 64. Similarly, another student made an error in the sign but obtained the accurate computation.

Moreover, a considerable proportion of the respondents demonstrated exceptional proficiency in executing the problem-solving plan, attaining an exemplary level of performance. The implementation of WBLR not only led to a proficient level of performance for the student in question but also facilitated effective plan execution by a substantial number of respondents, demonstrating an exemplary level of skills.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ETCOR REVIEW CENTER
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Table 5
Test of Correlations on the perception in the use of Web-Based Learning Resources and Problem-Solving Skills

WEB-BASED LEARNING RESOURCES	PROBLEM-SOLVING SKILLS
	r-value
Technical	.363*
Pedagogical	.384*

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Table 5 indicates the correlation between the perception in the use of Web-Based Learning Resources and Problem-Solving Skills. In terms of technical usability of WBLR and problem-solving skills, the data implies that when individuals perceive the technical usability of WBLR (such as ease of use, functionality, interface) more positively, they are likely to exhibit better problem-solving skills. In terms of pedagogical usability and problem-solving skills, the data implies that when individuals perceive the pedagogical usability of WBLR (such as instructional design, content relevance, interactivity) more favorably, they are more likely to demonstrate enhanced problem-solving skills.

The data implies that students who hold a positive perception of the use of Web-Based Learning Resources (WBLR) tend to exhibit higher scores in problem-solving skills. Similarly, students who possess a negative perception of WBLR are more prone to having lower scores in problem-solving. The positive correlations between WBLR perception and problem-solving skills imply that incorporating WBLR into educational settings can have a positive impact on problem-solving skills. These implications emphasize the importance of considering and addressing students' perception of WBLR to optimize their learning experience and promote the development of problem-solving skills.

According to Kartina (2018), Web-based resources could help students' learning mathematics independently. Students can repeat and relearn the material that has been delivered anywhere and anytime.

Table 6
Test of Differences on the Problem-Solving Skills of the students before and after using the Web-Based Learning Resources

Problem-Solving Skills	Pre-test		Post-test		t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Mean	Std. Deviation			
Understanding the problem	2.290	.490	2.657	.339	-3.777	29	.001
Constructing a plan	.741	.319	2.197	.598	-14.359	29	.000
Executing the plan	.171	.319	1.852	.760	-13.490	29	.000
Re-examining the answer	.0170	.0549	1.151	1.032	-6.100	29	.000
OVERALL	**.804**	**.186**	**1.963**	**.615**	**-11.758**	**29**	**.000**

if p ≤ .05 (significant); if p > .05 (not significant)

Table 6 are the t-test results on the mean pretest and posttest of the student between the Problem-Solving Skills of the students before and after using the Web-Based Learning Resources. The data indicates a significant improvement in the problem-solving skills of students who utilized Web-Based Learning Resources (WBLR).

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Specifically, there were significant enhancements in understanding the problem, constructing a plan, executing the plan, and re-examining the answer. Additionally, the overall mean pretest score experienced a substantial increase from .804 to 1.963. These changes resulted in an overall t-value of -11.758 and an overall p-value of .000, both of which are statistically significant at a significance level of 0.05. These findings demonstrate a significant difference in the problem-solving skills of students before and after using WBLR into their learning process.

The results implicate the potential of incorporating WBLR into blended learning approaches, where traditional classroom instruction is complemented by online resources. By integrating WBLR, educators can provide students with additional opportunities to practice and develop their problem-solving skills, leading to more comprehensive and effective learning experiences. The results emphasize the value of integrating technology in education. WBLR can provide students with interactive and engaging learning experiences, allowing them to develop problem-solving skills through the utilization of digital tools and resources. This highlights the need for educational institutions to embrace technology and provide adequate support and training for educators to effectively integrate WBLR into their teaching practices.

Likewise, Borba et al. (2016) emphasize that Mathematics in education has changed from stable to interactive representational contexts, allowing instructors and students to acquire knowledge and analyze critically. Thus, the advancement of the internet has brought about a change in relationships; correspondence has greatly altered, and the Internet is transforming mathematics instruction and the classroom.

Furthermore, the study conducted a one-month experiment to assess the effectiveness of Web-Based Learning Resources (WBLR) in enhancing students' problem-solving skills. The respondents largely expressed agreement regarding the usability of WBLR in both technical and pedagogical aspects. The researcher employed WBLR during various stages, including motivation, seat work, and quizzes, while guiding students on effectively utilizing and navigating the learning resources.

Although the students demonstrated proficiency in using technology, they still sought guidance from the teacher. Consequently, the researcher ensured that each learning resource was thoroughly explained during the initial stages. The study's findings indicated that the use of Web-Based Learning Resources significantly contributed to improving students' problem-solving skills and other mathematical competencies.

Summary, Conclusions, and Recommendations

The perceptions of the students in the use of Web-Based Learning Resources was strongly agree. Students' positive perception indicates the effectiveness of the platform in providing a seamless and accessible user experience. The platform's user-friendly design contributes to a favorable learning experience for most of the students.

The positive correlation between the perception of WBLR and problem-solving skills highlights the importance of creating a positive learning environment and designing WBLR effectively. It emphasizes the need for engaging and supportive learning experiences that foster students' motivation, engagement, and utilization of WBLR to develop their problem-solving abilities.

The improvement observed in the problem-solving skills is not due to random chance but is indeed a result of the intervention of WBLR. This indicates that WBLR has played a significant role in enhancing the students' skills to solve mathematical problems.

The researcher has drawn that there is a significant relationship between the perception in the use of Web-Based Learning Resources and Problem-Solving Skills in terms of understanding the problem, constructing a plan, executing the plan, and re-examining the answer. Also, there is a significant difference between the Problem-Solving Skills of the students before and after using the Web-Based Learning Resources.

Students are suggested to embrace the use of Web-Based Learning Resources to enhance their knowledge for the growing presence of technology in the educational environment. Teachers are suggested to incorporate Web-Based Learning Resources into their teaching methodologies to facilitate the development of ICT skills among students. Mathematics Teachers are suggested to implement the use of technology and online resources as part of their instructional approach to develop problem-solving skills in students. School Heads are suggested, if possible, to ensure the availability of reliable internet connectivity and necessary devices to facilitate full engagement with Web-Based Learning Resources (WBLR). While the current findings suggest that the use of Web-Based Learning Resources can be effective in improving the problem-solving skills, it would be beneficial for future researchers to conduct long-term research to examine the sustained effect of utilizing Web-Based Learning Resources (WBLRs) on the development of problem-solving skills.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

REFERENCES

Alkan, V. (2013). Reducing Mathematics Anxiety: The Ways Implemented by Teachers at Primary Schools. International J. Soc. Sci. & Education, 3, 3, 795 – 807. http://ijsse.com/sites/default/files/issues/2013/v3i3/Paper-25.pdf

Borba, M. C., Askar, P., Engelbrecht, J., Gadanidis, G., Llinares, S., & Sánchez-Aguilar, M. (2016). Blended learning, e-learning and mobile learning in mathematics education. ZDM Mathematics Education, 48, 589–610.

Chakraborty, S., Kanthamani, M., Chen, J., & Subramanian, L. (2012, March). On the feasibility and utility of web based educational lesson plans. In Proceedings of the 2nd ACM Symposium on Computing for Development (pp. 1-10).

Drake S. and Savage M. (2016). Living Transdisciplinary Curriculum: Teachers' Experiences with the International Baccalaureate's Primary Years Programme. International Electronic Journal of Elementary Education, September 2016, 9(1), 1-20.

Gautam, V., Khandelwal, S., & Dwivedi, R. (2020). The Impact of Self-Efficacy and Need for Achievement on Management Students' Perceptions Regarding Web Based Learning Resources. International Journal of Education and Development using Information and Communication Technical (IJEDICT), 2020, Vol. 16, Issue 2, pp. 68-83.

Gosper, M., Mcneill, M., Phillips, R., Preston, G., Woo, K., Green, D., Green, D. (2016). Web-based lecture technologies and learning and teaching: a study of change in four Australian universities.

Hadjerrouit, S. (2010). A conceptual framework for using and evaluating Web-based learning resources in school education. Journal of Information Technical Education, 9, 53-79. http://www.jite.org/documents/Vol9/JITEv9p053-079Hadjerrouit743.pdf

Jalmasco, N. M. (2014). *Science Education Realities*. The Manila Times.

Kaya D., Kesan C., and Izgiol D. (2012). "The Effect of Internet-Based Education on Student Success in Teaching Of 8th Grade Triangles Subject," Journal of Educational and Instructional Studies in the World, Vol. 2 No.4

Khattab, N. (2015). Students' aspirations, expectations, and school achievement: what really matters? Br Educ Res J, 41: 731-748. https://doi.org/10.1002/berj.3171

Kumar, V., & Sharma, D. (2021). E-Learning Theories, Components, and Cloud Computing-Based Learning Platforms. International Journal of Web-Based Learning and Teaching Technologies (IJWLTT), 16(3), 1-16. http://doi.org/10.4018/IJWLTT.20210501.oa1

Panergayo, A. A., & Aliazas, J. V. (2021). Students' Behavioral Intention to Use Learning Management System: The Mediating Role of Perceived Usefulness and Ease of Use. International Journal of Information and Education Technology, 11(11), 538-545.

Polya, G. (1962). Mathematical discovery: On understanding, learning, and teaching problem solving. New York: Wiley.

Simon, E. (2015). Teaching with web-based resources. Retrieved October 8, 2017. https://www.edutopia.org/blog/teaching-with-web-basedresources-edwige-simon.

ETCOR Educational Research Center PHILIPPINES
Sta. Ana, Pampanga, Philippines
INTERNATIONAL MULTIDISCIPLINARY RESEARCH CONFERENCE
Google Website: https://etcor.org
NBDB NATIONAL BOOK DEVELOPMENT BOARD PHILIPPINES
ISSN
iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577
ETCOR REVIEW CENTER
The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Voogt J., Erstad O., Dede C., Mishra P. (2013). "Challenges to learning and schooling in the digital networked world of the 21st century". Journal of Computer Assisted Learning Volume 29, Issue 5 p. 403-413. https://doi.org/10.1111/jcal.12029

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning–A literature review. Computers & Education, 149, 103818. https://doi.org/10.1016/j.compedu.2020.103818