# Technology Utilization, Critical Thinking, and Problem-Solving Skills of Junior High School Students

**Meagan L. Galanza[1], Sharon L. Apohen[2]**

**[1]Negros Occidental Conference Inc., Philippines**

**[2]La Carlota City College, Philippines**

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## ABSTRACT

This study determined the relationship between technology utilization and the critical thinking and problem-solving skills of junior high school students in a private secondary school in Negros Occidental during the school year 2026–2027. The study employed a quantitative descriptive-correlational research design. A total of 154 junior high school students were selected from a population of 250 students using stratified random sampling. Data were gathered through a standardized instruments and analyzed using mean, standard deviation, and Spearman's rho correlation coefficient. Findings revealed that the respondents demonstrated a high level of technology utilization, a high level of critical thinking skills, and a high level of problem-solving skills. The results further revealed a statistically significant moderate positive relationship between technology utilization and critical thinking skills. Likewise, a statistically significant moderate positive relationship was found between technology utilization and problem-solving skills. The study concluded that technology utilization significantly contributed to the development of students' critical thinking and problem-solving skills when appropriately integrated into educational activities. Therefore, schools and teachers should continue to promote meaningful, purposeful, and responsible use of educational technology to strengthen students' higher-order thinking skills and prepare them for the demands of the twenty-first century.

**Keywords:** Technology Utilization; Critical Thinking Skills; Problem-Solving Skills; Junior High School Students; Educational Technology; Higher-Order Thinking Skills; Private Secondary School

## INTRODUCTION

Technology has become an essential component of modern education, transforming the way students learn and interact with information. Educational technology plays a significant role in improving access to quality education, enhancing student engagement, and supporting diverse learning needs. In today's digital age, junior high school students are increasingly exposed to various technological tools such as smartphones, tablets, laptops, educational applications, online learning platforms, and internet resources (UNESCO, 2021). These technological advancements have reshaped traditional classrooms into more interactive and learner-centered environments where students can actively participate in the learning process.

The integration of technology in education has provided numerous opportunities for students to access information quickly, communicate effectively, collaborate with peers, and engage in meaningful learning experiences. Teachers increasingly utilize multimedia presentations, online assessments, educational games, and digital collaboration tools to improve student engagement and academic performance (Oliver & Tao, 2021). Furthermore, educational technology encourages independent learning and supports the development of higher-order thinking skills. According to Cruz Picón and Hernández Correa (2021), technology serves as a catalyst for active learning and the enhancement of critical thinking skills. Similarly, Shekhavtsova, Koknova, and Shekhavtsov (2021) found that web-based technologies contribute significantly to the development of students' critical thinking abilities.

Despite these recognized benefits, concerns remain regarding the actual utilization of technology among students and its influence on critical thinking and problem-solving skills. While technology is widely available in many educational settings, not all students use it effectively for academic purposes. Some students primarily

utilize digital devices for entertainment, gaming, and social media activities rather than for learning. Moreover, differences in access to technology, digital literacy, and teacher guidance may affect how students benefit from technological resources. These factors raise questions about whether increased technology use necessarily leads to improved critical thinking and problem-solving skills.

Previous studies have generally reported positive effects of educational technology on students' learning outcomes and cognitive development. However, findings remain inconsistent regarding the extent to which technology utilization directly influences critical thinking and problem-solving skills. Some studies suggest that technology enhances higher-order thinking when integrated effectively into instruction, while others indicate that technology alone does not guarantee the development of these competencies without appropriate learning strategies and guidance. Furthermore, most existing studies have focused on college students, general academic achievement, or technology integration practices, with limited attention given to junior high school students and the specific relationship between technology utilization and critical thinking and problem-solving skills.

In the Philippine context, particularly among junior high school students, empirical studies examining this relationship remain limited. As schools continue to invest in digital learning resources and technology-based instruction, there is a need to determine whether students' utilization of technology contributes to the development of essential 21st-century skills. Addressing this gap is important for understanding how technology can be used more effectively to promote meaningful learning and cognitive growth among learners.

Therefore, this study aims to determine the relationship between technological utilization and the critical thinking and problem-solving skills of junior high school students. The findings of this study may provide valuable insights for educators, school administrators, parents, and policymakers in designing strategies and interventions that maximize the educational benefits of technology and foster the development of critical thinking and problem-solving skills among students.

## METHODOLOGY

This study employed a quantitative descriptive-correlational research design to determine the extent of technology utilization and the levels of critical thinking and problem-solving skills among junior high school students in a private secondary school in Negros Occidental during school year 2026–2027. The descriptive component was used to determine the existing levels of the three variables, while the correlational component examined whether technology utilization was significantly related to students’ critical thinking and problem-solving skills. No intervention or manipulation of variables was undertaken.

The respondents consisted of 154 junior high school students selected from a total population of 250 students enrolled in Grades 7 to 10. The sample size was determined using Yamane’s formula with a 5% margin of error. Stratified random sampling was employed to ensure proportional representation of the four grade levels. The population was divided into strata according to grade level, after which the required number of respondents from each stratum was proportionately determined. Within each grade-level stratum, students were selected through simple random sampling using a lottery method. The distribution consisted of 41 Grade 7 students, 34 Grade 8 students, 39 Grade 9 students, and 40 Grade 10 students.

Data were collected using a structured questionnaire consisting of three parts. Part I measured technology utilization in terms of the use of digital devices for learning, educational applications and learning platforms, internet-based research and learning, multimedia and interactive learning tools, and online collaboration tools. Part II assessed critical thinking skills through the dimensions of analysis and interpretation, evaluation of information sources, logical reasoning and decision-making, creativity and innovation, and reflective thinking and self-assessment. Part III measured problem-solving skills in terms of identifying problems, developing possible solutions, applying strategies and tools, collaboration and team problem-solving, and evaluating solutions and outcomes. Each part employed a five-point Likert scale. The instrument was adapted from relevant standardized measures and subjected to expert evaluation to establish its validity and suitability for the respondents.

Prior to data collection, permission to conduct the study was secured from the school principal and relevant

school authorities. After approval, the researcher coordinated with class advisers regarding the administration of the questionnaires. The purpose of the study and the instructions for answering the questionnaire were clearly explained to the respondents. Participation was voluntary, and no personally identifiable information was collected. Completed questionnaires were checked for completeness, encoded, tabulated, and processed using the Statistical Package for the Social Sciences (SPSS). All collected data were treated confidentially and used solely for academic purposes.

For data analysis, mean and standard deviation were used to determine the extent of technology utilization and the levels of critical thinking and problem-solving skills. The mean scores were interpreted using a five-point scale ranging from 1.00 to 5.00, with higher scores indicating greater technology utilization or higher levels of the respective skills. To determine the relationships between technology utilization and critical thinking skills, and between technology utilization and problem-solving skills, the Spearman rank-order correlation coefficient (Spearman's rho) was employed. The use of Spearman's rho was appropriate for examining the direction and strength of association between the study variables based on the ordinal nature of the Likert-scale responses. Statistical significance was tested at the 0.05 level of significance. A p-value of $\leq 0.05$ indicated a statistically significant relationship, while a p-value greater than 0.05 indicated that the relationship was not statistically significant.

## RESULTS AND DISCUSSIONS

### Level of Technology Utilization

**Table 1. Level of Technology Utilization when taken as a whole and in terms of Digital Devices for Learning, Educational Applications and Learning Platforms, Internet-Based Learning, Multimedia Tools, And Online Collaboration Tools.**

| Statements | Mean | SD | Interpretation |
|---|---|---|---|
| **Digital Devices for Learning** | **3.93** | **0.67** | **High** |
| 1. I regularly use digital devices for schoolwork. | 3.79 | 0.87 | High |
| 2. I use technology to take notes, write reports, and complete assignments. | 3.71 | 1.00 | High |
| 3. I use technology during classroom discussions when needed. | 3.77 | 1.15 | High |
| 4. I use technology for research and project- making. | 4.38 | .93 | Very High |
| 5. I find it easier to study when using digital devices. | 4.02 | 1.06 | High |
| **Educational Applications and Learning Platforms** | **3.55** | **0.74** | **High** |
| 1. I use learning platforms. | 3.72 | 1.06 | High |
| 2. I use educational applications that help me understand lessons. | 3.84 | 1.09 | High |
| 3. I submit assignments online using school learning platforms. | 3.12 | 1.22 | Moderate |
| 4. Online quizzes and digital activities are part of my learning experience. | 3.40 | 1.34 | Moderate |
| 5. Technology platforms help me track my academic progress. | 3.68 | 1.17 | High |
| **Internet-Based Learning** | **4.01** | **0.66** | **High** |
| 1. I use the internet to search for academic information. | 4.45 | 0.83 | Very High |
| 2. I use online resources (articles, journals, e-books) for school tasks. | 3.87 | 1.12 | High |
| 3. I can easily access learning materials through the internet. | 4.10 | 0.94 | High |
| 4. I rely on online sources to understand difficult lessons. | 3.88 | 1.11 | High |
| 5. I use online learning videos (YouTube, educational websites) for study. | 3.74 | 1.31 | High |
| **Multimedia Tools** | **4.06** | **0.60** | High |
| 1. Teachers use multimedia presentations to teach lessons. | 4.14 | 0.91 | High |
| 2. I learn better when lessons include videos and Interactive materials. | 4.14 | 0.98 | High |
| 3. Technology-based presentations improve my understanding of | 4.08 | 0.90 | High |

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| topics. | | | |
| 4. I use digital tools to create presentations, reports, and projects. | 3.95 | 1.07 | High |
| 5. Interactive applications help me analyze and solve tasks. | 3.97 | 0.98 | High |
| **Online Collaboration Tools** | **4.03** | **0.71** | High |
| 1. I use online tools for group projects and collaboration. | 3.94 | 1.04 | High |
| 2. I communicate with classmates through online platforms for schoolwork. | 4.01 | 1.13 | High |
| 3. Technology helps me work with classmates outside school hours. | 4.21 | 1.00 | Very High |
| 4. Online collaboration tools improve teamwork in academic tasks. | 4.06 | 0.96 | High |
| 5. I can share ideas easily using digital communication tools. | 3.92 | 1.00 | High |
| **Technology Utilization (Overall Mean)** | **3.92** | **.52** | High |

*Legend: (4.21 –5.00)-Very High; (3.41 – 4.20)-High; (2.61 – 3.40)-Moderate; (1.81 – 2.60)-Low; (1.00 – 1.80)-Very Low*

Table 1 shows that the respondents demonstrated a high level of technology utilization (M = 3.92; SD = 0.52)**.** Among the dimensions, multimedia tools and interactive learning obtained the highest (M=4.06; SD=0.52)**,** followed closely by online collaboration tools (M=4.03; SD=0.71) and internet-based learning (M=4.01; SD=0.66)**,** all interpreted as high**.**

The dimension digital devices for learning also registered a high (M=3.93 SD=0.67)**,** while educational applications and learning platforms obtained the lowest (M= 3.55 SD=0.74)**,** although it remained within the high category.

The findings indicate that students frequently use technology to support their academic activities, particularly for research, collaboration, and interactive learning experiences. This suggests that technology has become an important component of students' learning processes and educational engagement.

**Level of Critical Thinking Skills**

**Table 2. Level of Critical Thinking Skills When Taken as a whole and in terms of Analysis and Interpretation, Evaluation of Information Sources, Logical Reasoning and Decision-Making, Creativity and Innovation in Solving Tasks, and Reflective Thinking and Self-Assessment.**

| Statements | Mean | SD | Interpretation |
|---|---|---|---|
| **Analysis and Interpretation** | **3.81** | **0.69** | **High** |
| 1. I can analyze information from different sources. | 3.97 | 0.86 | High |
| 2. I can interpret ideas and explain them in my own words. | 3.82 | 0.92 | High |
| 3. I can identify the important points in a reading material. | 3.81 | 0.92 | High |
| 4. I can compare different viewpoints before making conclusions. | 3.78 | 0.97 | High |
| 5. I can explain why an answer is correct. | 3.68 | 1.09 | High |
| **Evaluation of Information Sources** | **4.10** | **0.66** | **High** |
| 1. I check if online information is reliable before using it. | 4.39 | 0.78 | Very High |
| 2. I can identify fake news or misleading information. | 3.88 | 1.07 | High |
| 3. I verify sources before including them in schoolwork. | 4.21 | 0.83 | Very High |
| 4. I evaluate whether a source is credible or biased. | 3.94 | 0.91 | High |
| 5. I can differentiate facts from opinions. | 4.09 | 1.01 | High |
| **Logical Reasoning and Decision-Making** | **3.91** | **0.66** | **High** |
| 1. I use logical reasoning when answering difficult questions. | 3.97 | 0.93 | High |
| 2. I think carefully before making decisions in academic tasks. | 4.27 | 0.81 | Very High |
| 3. I can defend my answers with evidence. | 3.88 | 0.95 | Very High |
| 4. I can identify errors in reasoning when solving problems. | 3.66 | 0.97 | Very High |
| 5. I use facts and logic rather than guesses in answering. | 3.81 | 1.06 | Very High |

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| **Creativity and Innovation in Solving Tasks** | **3.94** | **0.65** | **Very High** |
| 1. I can think of creative ways to solve academic problems. | 3.96 | 0.91 | Very High |
| 2. I can create original ideas when doing projects. | 3.79 | 0.91 | High |
| 3. I can use technology to explore new ideas and solutions. | 4.22 | 0.88 | Very High |
| 4. I can design unique outputs using digital tools. | 3.97 | 0.96 | High |
| 5. I can think beyond common answers to solve challenges. | 3.73 | 1.00 | High |
| **Reflective Thinking and Self-Assessment** | **4.18** | **0.62** | **High** |
| 1. I reflect on my mistakes to improve my learning. | 4.44 | 0.75 | Very High |
| 2. I evaluate my work before submitting it. | 4.21 | 0.80 | Very High |
| 3. I accept feedback and use it to improve my performance. | 4.30 | 0.83 | Very High |
| 4. I assess whether my solution is effective. | 3.94 | 0.90 | High |
| 5. I revise my answers after reviewing the results. | 4.01 | 0.91 | High |
| **Critical thinking skills (Overall Mean)** | **3.99** | **0.55** | **High** |

*Legend: (4.21 – 5.00)-Very High; (3.41 – 4.20)-High; (2.61 – 3.40)-Moderate; (1.81 –2.60)-Low; (1.00 – 1.80)-Very Low*

Table 2 shows that the respondents possessed a high level of critical thinking **s**kills, (M 3.99; SD = 0.55). Among the indicators, reflective thinking and self-assessment obtained the highest (M=4.18; SD=0.62), followed by evaluation of information sources (M=4.10; SD=0.66), both interpreted as high. Meanwhile, analysis and interpretation recorded the lowest (M=3.81; SD=0.69), which still falls under the high category.

These findings mean that students are generally capable of evaluating information, reflecting on their learning experiences, and making informed judgments. The consistently high ratings across all dimensions suggest that students possess well-developed critical thinking abilities necessary for academic success and lifelong learning.

**Level of Problem-Solving Skills**

**Table 3. Level of Problem-solving skills when taken as a whole and in terms of Identifying Problems Clearly, Developing Possible Solutions, Applying Strategies and Tools in Solving Problems, Collaboration in Solving Tasks, and Evaluating Solutions and Outcomes.**

| Statements | Mean | SD | Interpretation |
|---|---|---|---|
| **Identifying Problems Clearly** | **3.84** | **0.70** | **High** |
| 1. I can identify the main problem in each situation. | 3.89 | 0.87 | High |
| 2. I can recognize what information is needed to solve a problem. | 3.79 | 0.84 | High |
| 3. I can separate relevant from irrelevant information. | 3.68 | 0.97 | High |
| 4. I can understand instructions clearly before answering. | 4.00 | 0.93 | High |
| 5. I can explain the problem in my own words. | 3.82 | 1.12 | High |
| **Developing Possible Solutions** | **3.90** | **0.66** | **High** |
| 1. I can think of different solutions to one problem. | 3.95 | 0.84 | High |
| 2. I can brainstorm ideas before choosing the best solution. | 3.81 | 0.93 | High |
| 3. I consider possible consequences of my choices. | 3.94 | 0.94 | High |
| 4.I can create step-by-step plans to solve problems. | 3.79 | 1.00 | High |
| 5. I can choose the most practical solution. | 3.99 | 0.89 | High |
| **Applying Strategies and Tools in Solving Problems** | **3.97** | **0.62** | **High** |
| 1. I can use appropriate strategies in solving problems. | 4.06 | 0.81 | High |
| 2. I can apply learned concepts to real-life situations. | 4.07 | 0.88 | High |
| 3. I use technology tools (apps/calculators/simulations) to solve tasks. | 4.18 | 0.99 | High |
| 4. I can follow correct steps when solving academic problems. | 4.03 | 0.87 | High |
| 5. I can solve problems even if they are difficult. | 3.49 | 1.02 | High |
| **Collaboration in Solving Tasks** | **4.14** | **0.61** | **High** |
| 1. I can work well with classmates in solving tasks. | 3.85 | 1.01 | High |

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| 2. I listen to others' ideas before deciding on a solution. | 4.18 | 0.87 | High |
| 3. I can share my ideas clearly during group discussions. | 3.77 | 1.07 | High |
| 4.Technology helps my group solve problems more efficiently. | 4.31 | 0.80 | Very High |
| 5. I respect other people's opinions during teamwork. | 4.57 | 0.68 | Very High |
| **Evaluating Solutions and Outcomes** | **4.12** | **0.63** | **High** |
| 1. I check whether my solution answers the problem correctly. | 4.35 | 0.69 | Very High |
| 2. I evaluate the effectiveness of my chosen solution. | 4.08 | 0.81 | High |
| 3. I learn from errors and try again when my answer is incorrect. | 4.27 | 0.88 | Very High |
| 4. I can explain the process I used in solving problems. | 3.82 | 1.03 | High |
| 5. I can improve my solutions after reviewing results. | 4.07 | 0.94 | High |
| **Problem-solving skills (Overall Mean)** | **3.99** | **0.54** | **High** |

*Legend: (4.21 – 5.00)-Very High; (3.41 – 4.20)-High; (2.61 – 3.40)-Moderate; (1.81 – 2.60)-Low; (1.00 – 1.80)-Very Low*

Table 3 shows that the respondents displayed a high level of problem-solving skills**,** (M=3.99; SD = 0.54)**.** The highest-rated dimension was collaboration in solving tasks with a (M=4.14; SD= 0.61), followed by evaluating solutions and outcomes (M=4.12; SD=0.63) and applying strategies and tools in solving problems (M=3.97; SD=0.62)**.** The lowest mean was obtained by identifying problems clearly M=3.84; SD =0.70)**;** however, it was still interpreted as high**.**

The results suggest that students can work collaboratively, applying appropriate strategies, and assessing the effectiveness of their solutions when confronted with problems. Overall, the respondents demonstrate strong problem-solving competencies that are essential in academic and real-life situations.

**Technology Utilization and Critical Thinking Skills**

**Table 4. Relationship between Technology Utilization and Critical Thinking Skills.**

| Variable | Test Statistics ($r_s$) | p-value | Decision for $H_o$ | Interpretation |
|---|---|---|---|---|
| Level of Technology Utilization vs. Level of Critical Thinking Skills | 0.472 | <0.001 | Reject $H_o$ | Significant |

Table 4 presents the relationship between technology utilization and critical thinking skills. The computed Spearman Rank-Order Correlation Coefficient ($r_s$ = 0.472) with a p-value of less than 0.001 indicates a moderate positive and statistically significant relationship between the two variables. Since the p-value is less than the 0.05 level of significance, the null hypothesis was rejected**.**

This means that higher levels of technology utilization are associated with higher levels of critical thinking skills among students. The finding suggests that the use of technology in learning may contribute to the enhancement of students' ability to analyze information, evaluate sources, and make logical decisions.

Several studies suggest that technology utilization positively influences critical thinking skills. Cruz Picón and Hernández Correa (2021) found that educational technology encourages inquiry, analysis, reflection, and independent learning. Similarly, Shekhavtsova et al. (2021) reported that web-based technologies enhance learners' ability to evaluate information and think critically. Interactive technologies provide opportunities for students to engage in analytical tasks, information evaluation, and reflective learning activities.

**Technology Utilization and Problem-Solving Skills**

**Table 5. Relationship between Technology Utilization and Problem-Solving Skills.**

| Variable | Test Statistics ($r_s$) | p-value | Decision for $H_o$ | Interpretation |
|---|---|---|---|---|
| Level of Technology Utilization vs. Level of Problem-Solving Skills | 0.539 | <0.001 | Reject $H_o$ | Significant |

Table 5 shows the relationship between technology utilization and problem-solving skills. The computed Spearman Rank-Order Correlation Coefficient ($r_s$ = 0.539) and p-value of less than 0.001 indicate a moderate positive and statistically significant relationship between the variables. Since the p-value is lower than the 0.05 level of significance, the null hypothesis was rejected.

This finding implies that students who exhibit higher levels of technology utilization also tend to possess better problem-solving skills. The result suggests that technology use may support students in identifying problems, developing solutions, and evaluating outcomes more effectively, thereby enhancing their overall problem-solving abilities.

Technology utilization also contributes to the development of problem-solving skills. Bransford, Brown, and Cocking (2000) emphasized that technology-rich learning environments allow students to explore problems, test solutions, and evaluate outcomes. Educational simulations, digital games, and project-based learning activities encourage learners to apply knowledge and develop effective problem-solving strategies.

Critical thinking and problem-solving skills are closely related constructs. According to Dwyer (2023), critical thinking serves as the foundation for effective problem-solving because learners must analyze information, evaluate alternatives, and make logical decisions before solving problems. Students with stronger critical thinking skills are generally better equipped to identify problems, generate solutions, and evaluate outcomes.

Foreign studies consistently indicate that educational technology positively influences students' critical thinking and problem-solving abilities. Studies by Xue et al. (2023), Alam and Mohanty (2023), and UNESCO (2023) reported that students who actively engage with educational technologies demonstrate higher levels of analytical thinking, collaboration, creativity, and decision-making skills.

Local studies revealed that technology integration improves academic engagement, independent learning, and digital literacy among Filipino students. However, researchers also identified challenges such as limited internet access, inadequate technological resources, and distractions associated with non-academic technology use (DepEd, 2020).

## CONCLUSIONS

Based on the findings of the study, the following conclusions were formulated:

Students utilize technology extensively in their academic activities, indicating that digital tools, online resources, and collaborative technologies have become integral parts of the learning process.

Students possess a high level of critical thinking skills, demonstrating their ability to analyze information, evaluate sources, make sound judgments, and reflect on their learning experiences.

Students also exhibit a high level of problem-solving skills, enabling them to identify problems, formulate possible solutions, apply strategies, collaborate with others, and evaluate outcomes effectively.

The increased use of educational technology is associated with improved critical thinking abilities among students.

Technology utilization and problem- solving skills suggests that greater engagement with technology contributes to the development of students' problem-solving competencies.

Technology utilization serves as an important factor in enhancing students' higher-order thinking skills, particularly critical thinking and problem-solving skills.

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