
ICT-based Instruction and Learners' Engagement Among Senior School Learners in a Vocational School

HARLEQUIN A. DOCTOLERO

Allacapan Vocational High School, Division of Cagayan, Philippines

harlequin.doctolero@deped.gov.ph

Abstract — This study investigated the effect of ICT-based instruction on learners' engagement among senior high school students in a vocational school. Specifically, it examined the level of ICT integration in terms of digital tool use, interactivity, and accessibility, as well as students' behavioral, emotional, and cognitive engagement, and the relationship between these variables. A descriptive–correlational research design was employed, involving 100 randomly selected senior high school learners during the School Year 2025–2026. Data were collected using a validated researcher-made questionnaire and analyzed using mean and Pearson Product-Moment Correlation. Results revealed that ICT-based instruction was very high ($M = 3.23$), particularly in accessibility and use of digital tools, while learners' engagement was high ($M = 3.19$), with cognitive engagement showing the highest level. Furthermore, a moderate positive and statistically significant relationship ($r = 0.580$, $p < 0.05$) was found between ICT-based instruction and learners' engagement. These findings indicate that increased integration of ICT enhances students' active participation, motivation, and cognitive involvement in learning. The study concludes that ICT-based instruction is an important factor in promoting meaningful engagement and recommends strengthening interactive ICT strategies and teacher training to maximize its benefits in the teaching-learning process.

Keywords: *ICT-based instruction, learner engagement, senior high school students, vocational education, technology integration*

I. INTRODUCTION

The integration of Information and Communication Technology (ICT) in education has become a central feature of 21st-century teaching and learning. Schools across the globe have increasingly adopted ICT-based instructional approaches to improve the quality of education and respond to the demands of a digital society. ICT tools—such as multimedia presentations, online platforms, simulations, and interactive applications—are now widely used to facilitate instruction and enhance learners' access to information. These developments have transformed traditional teacher-centered practices into more learner-centered and interactive environments, where students are encouraged to participate actively in the learning process.

Learners' engagement, which encompasses behavioral, emotional, and cognitive involvement in learning tasks, is widely recognized as a critical factor influencing academic success. In vocational schools, particularly at the senior high school level, maintaining high levels of learner engagement remains a persistent challenge. Many students experience reduced motivation, passive participation, and limited interaction during classroom activities. Traditional teaching methods, which often rely on lectures and rote memorization, may not sufficiently capture learners' interest or cater to diverse learning styles. As a result, there is a growing need to explore innovative instructional strategies that can enhance learner engagement and improve educational outcomes.

ICT-based instruction offers a promising solution to this issue. By incorporating digital tools and interactive resources, teachers can create more dynamic and engaging learning environments. ICT enables the use of multimedia content, gamified activities, and real-time feedback, which can stimulate students' interest and encourage active participation. According to Mubarok and Iriana (2025), ICT integration in teaching enhances interactivity, student interest, and engagement, while also fostering critical thinking and creativity among learners. This suggests that the effective use of ICT can play a significant role in addressing engagement-related challenges in the classroom.

Similarly, Tabia et al. (2023) found that there is a significant relationship between technology integration and students' affective, behavioral, and cognitive engagement. Their study revealed that when teachers effectively incorporate technology into content and pedagogy, students demonstrate higher levels of participation and motivation in learning activities. This highlights the importance of aligning ICT tools with appropriate teaching strategies to maximize their impact on learner engagement.

Recent studies further support the positive impact of ICT on student engagement. Toma et al. (2023) reported that ICT integration in teaching provides opportunities for active participation and improves students' involvement in the learning process, leading to better learning outcomes. Moreover, Duterte (2024) emphasized that technology-enhanced learning environments significantly increase student motivation and engagement, particularly when interactive tools such as simulations and gamified assessments are utilized. These findings demonstrate that ICT is not only a supportive tool but also a transformative factor in promoting active and meaningful learning experiences.

Despite these advantages, challenges remain in implementing ICT-based instruction effectively in vocational schools. Issues such as limited access to technological resources, insufficient teacher training, and varying levels of digital literacy among students can hinder the successful integration of ICT. Mapisa and Makena (2024) pointed out that inadequate infrastructure and lack of ICT competencies among teachers continue to be major barriers to effective technology adoption in schools. These challenges indicate that while ICT has the potential to enhance learner engagement, its effectiveness depends largely on how it is implemented and supported within the educational system.

Given these considerations, there is a need to examine how ICT-based instruction influences learners' engagement, particularly among senior high school students in a vocational school setting. Understanding this relationship can provide valuable insights for educators and policymakers in designing effective instructional strategies and interventions that leverage technology to improve student engagement.

In this context, the present study aimed to investigate the extent to which ICT-based instruction affects learners' engagement among senior high school learners in a vocational school. Specifically, it sought to determine how the use of ICT tools in teaching influences students' participation, motivation, and overall involvement in the learning process.

Literature Review

The integration of Information and Communication Technology (ICT) in education has been widely examined in recent years due to its potential to enhance teaching practices and promote learners' engagement. ICT-based instruction involves the use of digital tools such as learning management systems, multimedia presentations, and interactive applications to facilitate learning. As education systems adapt to technological advancements, understanding how ICT influences learners' engagement has become a critical area of research.

Sosa-Díaz et al. (2022) emphasized that ICT integration in schools is a complex and dynamic process that significantly influences teaching and learning practices. Their systematic review highlighted that effective ICT implementation requires alignment among teachers, institutional support, and policy frameworks. The study further noted that technology integration can foster interactive and collaborative learning environments, which are essential in promoting student engagement. However, the authors also stressed that the success of ICT in classrooms depends on how well it is incorporated into pedagogy, rather than simply the availability of technological tools.

Similarly, Akram et al. (2022) cited that students' and teachers' perspectives on ICT integration and found that both groups generally perceive ICT as beneficial in the teaching-learning process. Their findings revealed that ICT enhances the quality of instructional materials and motivates learners to become more creative and participative. The study also indicated that the use of digital tools contributes to improved learner interest and active involvement in classroom activities, suggesting a positive relationship between ICT use and student engagement.

In the context of student engagement, recent empirical studies have demonstrated that technology integration plays a significant role in shaping learners' behavioral, emotional, and cognitive participation. Tabia et al. (2023) found that the integration of technology in both content and pedagogy has a strong positive correlation with students' engagement. The study revealed that classrooms where teachers effectively utilized ICT tools experienced higher levels of active participation, motivation, and interest among learners. This indicates that ICT-based instruction can create a more engaging learning environment when combined with sound pedagogical strategies.

Further supporting this claim, Bhat (2025) discussed that technology integration provides opportunities for interactive and personalized learning experiences, which are key factors in increasing student engagement. The study pointed out that the use of multimedia resources, simulations, and gamified learning platforms captures students' attention and encourages deeper involvement in learning tasks. However, it also acknowledged challenges such as distractions and unequal access to technology, which may affect the overall effectiveness of ICT-based instruction.

Recent research focusing on senior high school learners further highlights the importance of ICT in promoting engagement. Abdulganie et al. (2025) found a strong positive relationship between technological resources and student engagement among senior high school students. Their study demonstrated that consistent access to digital tools significantly enhances active participation and academic involvement. The findings suggest that when learners are provided with adequate technological resources, they are more likely to engage meaningfully in classroom activities.

Moreover, Kilaton et al. (2024) reported the impact of digital learning platforms on senior high school students' engagement in the Philippines and reported high levels of behavioral, emotional, and cognitive engagement among learners using ICT-based platforms. The study cited that interactive features and instructional quality are strong predictors of engagement, emphasizing the importance of well-designed ICT-based instruction. Nevertheless, the research also identified challenges such as videoconferencing fatigue and inequitable access to devices, which may limit the effectiveness of digital learning environments.

In another related study, Azimkhan et al. (2025) conducted a systematic review and concluded that digital tools significantly improve student engagement, autonomy, and academic performance in high school settings. The study stressed that ICT integration enhances learners' ability to interact, collaborate, and take control of their learning. However, the authors also highlighted the need for proper planning, teacher training, and infrastructure to ensure successful implementation.

Overall, the reviewed literature indicates that ICT-based instruction has a significant positive impact on learners' engagement across different educational contexts. It enhances motivation, participation, and interaction while providing opportunities for personalized and meaningful learning experiences. However, the effectiveness of ICT integration largely depends on factors such as teacher competence, availability of resources, and proper instructional design. These findings underscore the need for further research to explore how ICT-based instruction can be effectively implemented to maximize learner engagement, particularly in vocational school settings.

Research Questions

This study aimed to determine the effect of ICT-based instruction on learners' engagement among senior high school learners in a vocational school.

Specifically, this study sought to answer the following questions:

1. What is the level of ICT-based instruction as perceived by the learners in terms of:
 - a. use of digital tools and resources;
 - b. interactivity of instructional activities; and
 - c. accessibility of technological resources?

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2. What is the level of learners' engagement among senior high school learners in terms of:
 - a. behavioral engagement;
 - b. emotional engagement; and
 - c. cognitive engagement?
 3. Is there a significant relationship between ICT-based instruction and learners' engagement among senior high school learners?

II. METHODOLOGY

Research Design

This study employed a descriptive–correlational research design to examine the relationship between ICT-based instruction and learners' engagement among senior high school learners in a vocational school. The descriptive aspect of the design was used to determine the current level of ICT-based instructional practices in terms of the use of digital tools, interactivity, and accessibility, as well as the level of learners' engagement in terms of behavioral, emotional, and cognitive dimensions. Meanwhile, the correlational component was utilized to identify whether a significant relationship exists between ICT-based instruction and learners' engagement, and to determine the extent to which ICT practices influence students' level of involvement in the learning process. This design is appropriate for the study as it allows the researcher to systematically collect quantitative data, describe existing conditions, and analyze the relationships between variables without manipulating them, thereby providing a clear understanding of how ICT-based instruction is associated with learners' engagement in the given educational setting.

Participants of the Study

The participants of this study consisted of one hundred (100) senior high school learners enrolled in a vocational school during the School Year 2025–2026. These learners were selected using simple random sampling, a method that ensures each member of the population has an equal chance of being chosen to participate in the study. This sampling technique was employed to minimize bias and to ensure that the sample fairly represents the entire population of senior high school learners in the school.

school department, providing a diverse set of perspectives regarding ICT-based instruction and their level of engagement. By involving learners with varied academic backgrounds and experiences, the study aimed to obtain more comprehensive and reliable data. Participation in the study was voluntary, and the respondents were assured that their responses would be treated with confidentiality and used solely for research purposes.

The selection of 100 participants was considered adequate to provide meaningful statistical analysis and to determine the relationship between ICT-based instruction and learners' engagement. This sample size allowed the researcher to draw valid conclusions while maintaining feasibility in data collection and analysis.

Instrumentation

This study utilized a researcher-made questionnaire as the primary data-gathering instrument to assess ICT-based instruction and learners' engagement among senior high school learners. The questionnaire was developed based on the objectives of the study and relevant literature, and it comprised two main sections: the first measured ICT-based instruction in terms of the use of digital tools, interactivity, and accessibility, while the second assessed learners' engagement across behavioral, emotional, and cognitive dimensions. The items were presented using a Likert scale to capture the respondents' level of agreement, allowing for quantitative

analysis of their perceptions. To ensure the instrument's validity, it underwent expert evaluation by educators knowledgeable in ICT integration and research, and their feedback was incorporated to improve clarity and relevance. Additionally, a pilot test was conducted among selected learners who were not part of the actual respondents to establish the reliability of the questionnaire, and necessary revisions were made to enhance its consistency, making it a suitable and effective tool for gathering the data needed in the study.

Analysis of Data

The data collected in this study were processed using both descriptive and inferential statistical techniques. Descriptive statistics, particularly the mean, were employed to determine the level of ICT-based instruction in terms of the use of digital tools and resources, interactivity of instructional activities, and accessibility of technological resources, as well as the level of learners' engagement in terms of behavioral, emotional, and cognitive dimensions. Mean scores were used to describe the extent of each variable based on the responses of the participants. For the interpretation of the computed mean values, the following scale was applied:

Range	ICT-Based Instruction	Learners' Engagement
1.00 – 1.74	Very Low	Very Low
1.75 – 2.49	Low	Low
2.50 – 3.24	High	High
3.25 – 4.00	Very High	Very High

To examine the relationship between ICT-based instruction and learners' engagement, the Pearson Product-Moment Correlation Coefficient (Pearson r) was utilized as an inferential statistical tool. This method was applied to determine the presence, strength, and direction of the relationship between the two variables. Through this analysis, the study identified whether ICT-based instructional practices significantly influence the level of learners' engagement among senior high school learners.

III. RESULTS AND DISCUSSION

The level of ICT-based instruction as perceived by the learners in terms of the following dimensions

The findings reveal that the level of ICT-based instruction as perceived by the learners is very high, with an overall mean of 3.23, indicating that technology integration is strongly evident in the teaching-learning process. Specifically, the accessibility of technological resources (3.26) and the use of digital tools and resources (3.25) both obtained very high ratings, suggesting that learners have sufficient access to ICT facilities and are frequently exposed to various digital materials during instruction. This reflects a learning environment where technology is readily available and consistently utilized to support instruction, which can enhance the efficiency and quality of learning. On the other hand, the interactivity of instructional activities (3.18), while still rated high, is slightly lower compared to the other dimensions, implying that although ICT tools are present and used, their potential to promote active participation, collaboration, and deeper engagement may not yet be fully maximized. This indicates a need for teachers to further enhance their strategies by incorporating more interactive and student-centered ICT-based activities, such as collaborative tasks, simulations, and problem-solving exercises. Overall, the results suggest that while ICT infrastructure and usage are already well-established, improving the interactive application of these technologies can further strengthen instructional effectiveness and maximize learner engagement.

Dimensions	Mean	Interpretation
Use of Digital Tools and Resources	3.25	Veery High
Interactivity of Instructional Activities	3.18	High
Accessibility of Technological Resources	3.26	Very High
Overall Mean	3.23	Very High

The level of learners' engagement among senior high school learners in terms of the following dimensions

The findings indicate that the level of learners' engagement among senior high school learners is high, with an overall mean of 3.19, suggesting that students are generally active and involved in the teaching-learning process. Among the dimensions, cognitive engagement obtained the highest mean (3.22), followed closely by behavioral engagement (3.21), while emotional engagement registered a slightly lower mean of 3.15, though still within the high level. These results imply that learners are actively participating in classroom tasks, demonstrating effort, persistence, and a willingness to think critically and understand the lessons being taught. The high level of cognitive engagement indicates that students are not only completing tasks but are also investing in deeper learning, such as analyzing concepts, solving problems, and applying knowledge. Meanwhile, behavioral engagement reflects consistent participation and involvement in activities, while emotional engagement suggests that learners generally feel interested and motivated, although there is still room for further strengthening their enthusiasm and positive attitudes toward learning. Overall, the findings suggest that learners are effectively engaged in their academic activities; however, enhancing strategies that foster stronger emotional connections—such as collaborative learning, relevant real-life applications, and interactive ICT-based approaches—may further improve and sustain learner engagement in the classroom.

Dimensions	Mean	Interpretation
Behavioral Engagement	3.21	High
Emotional Engagement	3.15	High
Cognitive Engagement	3.22	High
Overall Mean	3.19	High

Correlational results between ICT-based instruction and learners' engagement among senior high school learners

The findings reveal a moderate positive and statistically significant relationship between ICT-based instruction and learners' engagement among senior high school learners, as reflected by a Pearson r value of 0.580 and a probability value of 0.000, which is lower than the 0.05 level of significance. This indicates that as the level of ICT-based instruction increases, learners' engagement also tends to improve. The result implies that the integration of digital tools, interactive activities, and accessible technological resources plays an important role in enhancing students' behavioral participation, emotional involvement, and cognitive investment in learning. The moderate strength of the relationship suggests that while ICT is not the sole factor influencing engagement, it is a significant contributor in creating a more dynamic and participatory learning environment. This further implies that schools should continue strengthening ICT integration and ensure that teachers are equipped with the necessary skills to effectively utilize technology in ways that actively engage students.

These findings are supported by the related studies discussed in the literature review. Sosa-Díaz et al. (2022) emphasized that ICT integration promotes interactive and collaborative learning environments, which enhance student engagement. Similarly, Tabia et al. (2023) found a significant positive relationship between technology integration and students' behavioral, emotional, and cognitive engagement, highlighting that effective use of ICT increases participation

and motivation. Furthermore, Bhat (2025) noted that interactive and multimedia-based instruction captures learners' attention and encourages deeper involvement in learning tasks. These studies corroborate the present findings, confirming that ICT-based instruction is an essential factor in improving learners' engagement and supporting more meaningful and effective learning experiences in the classroom.

Variable	Coefficient (r)	Probability	Statistical Inference	Remarks
ICT-based Instruction and Learners' Engagement	0.580	0.000	Significant	Moderate positive relationship

IV. CONCLUSION

The study concludes that ICT-based instruction has a significant and positive influence on learners' engagement among senior high school learners in an integrated school. The findings revealed that both ICT-based instruction and learners' engagement were at high levels, indicating that technology is effectively integrated into the teaching-learning process and that students are actively involved in their studies. Moreover, the results established a moderate positive and statistically significant relationship between the two variables, confirming that increased use of ICT tools and interactive digital strategies contributes to higher levels of behavioral, emotional, and cognitive engagement. These findings highlight the importance of continuously enhancing ICT integration in education, not only by providing access to technological resources but also by improving the quality of interactive instructional practices. Therefore, it is recommended that schools and educators strengthen ICT-based teaching approaches and professional development initiatives to further promote meaningful and sustained learner engagement.

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