The Effects of AI Tools on the Academic Performance and Engagement of TVL Learners

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ABSTRACT

This study investigated the level of Artificial Intelligence (AI) exposure, its perceived effects on academic performance, learning engagement, and motivation, as well as the challenges and recommended strategies for AI integration among Technical-Vocational-Livelihood (TVL) Senior High School students. A mixed-methods research design was employed, involving 56 respondents selected using Slovin's formula. Data were gathered through a structured questionnaire comprising quantitative items and open-ended questions. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used for quantitative analysis, while qualitative responses were thematically analyzed.

Results indicate that TVL students exhibit a moderate level of AI exposure, with frequent use of AI chatbots and writing assistants, but limited utilization of AI tools directly aligned with technical and vocational competencies, such as virtual laboratories and AI-assisted design applications. AI use was perceived to positively influence academic performance, particularly in task completion and conceptual understanding. However, students reported generally neutral perceptions regarding AI's impact on learning engagement and motivation. Major challenges identified include limited internet connectivity, insufficient access to AI tools, lack of teacher guidance, and ethical concerns related to overreliance and academic integrity.

The study concludes that AI has significant potential to enhance TVL education, provided that adequate infrastructure, instructional support, and ethical guidelines are established.

INTRODUCTION

Background of the Study

Artificial intelligence (AI) is now commonly used in everyday life. It was coined in the 1950s (Helm et al., 2020) and has been continuously adopted by people because of its reliability, efficiency, and ability to simplify human tasks (Delipetrev et al., 2020).

In education, AI has transformed how learners acquire knowledge and how teachers deliver instruction. It enables adaptive learning systems, intelligent tutoring, and personalized feedback that improve engagement and performance (Chen et al., 2020; Ayeni et al., 2024). Studies also show that AI promotes individualized learning paths that cater to diverse student needs and learning styles (Onyebuchi et al., 2024). However, most of these applications are concentrated in higher education, leaving limited evidence on how AI influences students in technical-vocational settings where hands-on learning is essential (Wu & Yu, 2024; Kim et al., 2022).

Moreover, while AI fosters curiosity and motivation, it may also encourage dependence and ethical challenges, such as academic dishonesty and privacy concerns (Humble et al., 2024; Özer, 2024; Seo et al., 2021). For Technical-Vocational-Livelihood (TVL) students, who rely heavily on experiential learning, the effective integration of AI requires balancing technological innovation with authenticity, inclusivity, and equity (Song et

al., 2024). Thus, this study aims to explore how AI influences the academic performance, engagement, and motivation of Senior High School TVL students, providing insights that can guide future AI-enhanced teaching and learning strategies.

B. Statement of the Problem

This study aims to examine how the integration and use of Artificial Intelligence (AI) influence the academic performance, learning behavior, and motivation of Senior High School students enrolled in the Technical-Vocational-Livelihood (TVL) track. Specifically, it seeks to answer the following questions:

1. What is the level of exposure of Senior High School TVL students to AI-based learning tools and applications?

2. How does the use of AI affect the following aspects of learners?

a. Academic performance

b. Learning engagement

c. Motivation toward learning

3. Is there a significant relationship between students' level of AI exposure and their academic performance?

4. What challenges do TVL students encounter in using AI tools in their learning process?

5. What strategies can be proposed to maximize the positive effects of AI on TVL students' learning outcomes?

Objectives of the Study

The main objective of this study is to determine the effects of Artificial Intelligence (AI) on the learning experiences and academic performance of Senior High School students under the Technical-Vocational-Livelihood (TVL) track. Specifically, this study aims to:

1. Assess the level of exposure of Senior High School TVL students to AI-based learning tools and applications;

2. Examine the effects of AI use on students' academic performance, learning engagement, and motivation;

3. Determine the relationship between the level of AI exposure and academic performance of TVL students;

4. Identify the challenges encountered by students in integrating AI tools into their learning process; and,

5. Propose strategies or interventions to enhance the positive impact of AI on TVL education.

Significance of the Study

This study is significant to various stakeholders in education:

- **Students.** The findings can help TVL students understand how AI tools can enhance their learning efficiency, critical thinking, and motivation.

- **Teachers.** The study may guide teachers in integrating AI-driven tools effectively into instruction, ensuring that technology supports skill-based learning.

- **School Administrators.** Results may provide insights for developing policies or programs that promote responsible and productive AI use within the TVL curriculum.

- **Curriculum Developers.** The research may serve as a reference in designing AI-enhanced modules and learning materials suited for TVL learners.

- **Future Researchers.** This study can serve as a baseline for further research on AI's impact on technical-vocational education in the Philippine context.

Scope and Delimitation

This study focuses on examining the effects of Artificial Intelligence (AI) integration on the learning experiences, academic performance, engagement, and motivation of Senior High School students under the Technical-Vocational-Livelihood (TVL) track. The research will be conducted among currently enrolled Grade 11 and Grade 12 TVL students at Bagbag Solsona National High School during the School Year 2025–2026. The representative sample of the population will be determined using Slovin's formula to ensure statistical accuracy and fairness in participant selection.

The scope of the study is limited to assessing the extent of AI exposure and its influence on cognitive and behavioral aspects of learning. AI tools considered in this study include chatbots, adaptive learning platforms, and intelligent tutoring systems that support instruction and learning enhancement. The study will also explore students' perceptions of how AI affects their academic engagement and motivation toward skill-based learning activities.

This study is limited to one public senior high school offering the TVL track, due to time and logistical constraints of the research setting. While the findings may not be generalized to all TVL learners across other schools or regions, the results provide important baseline evidence on AI exposure and learning outcomes within a rural technical-vocational context. This delimitation allows the study to focus on the immediate academic and motivational effects of AI integration among TVL students in a real classroom environment.

However, this research does not cover long-term learning retention, affective or emotional outcomes, or external factors such as socio-economic background, home environment, and availability of digital resources outside school. These delimitations are set to ensure the study remains focused on the immediate academic and motivational effects of AI integration within the classroom context of TVL education.

Definition of Terms

To ensure clarity and consistency throughout the study, the following key terms are defined:

- **Academic Performance** – The measurable achievement of a student in their studies, often assessed through grades, practical evaluations, and academic outputs.

- **Artificial Intelligence (AI)** – The simulation of human intelligence in machines or computer systems that can perform tasks such as learning, reasoning, problem-solving, and decision-making (Helm et al., 2020).

- **AI Exposure** – The extent to which learners interact with or utilize AI-based tools, applications, or systems in their academic activities.

- **AI Tools** – Software or applications powered by artificial intelligence, such as chatbots, intelligent tutoring systems, recommendation algorithms, or virtual lab environments, used to support teaching and learning.

- **Curriculum Developers** – Professionals responsible for designing, evaluating, and updating instructional content and learning strategies within educational institutions.

- **Learning Engagement** – The degree of attention, curiosity, and interest that a student shows when learning, which directly affects their motivation and persistence.

- **Learning Motivation** – The internal drive or external incentive that compels a student to initiate, continue, and succeed in a learning activity.

- **Personalized Learning** – An educational approach enabled by AI that adapts content, pace, and method of instruction to the unique needs of individual learners.
- **Senior High School (SHS)** – The final two years of the K–12 educational system in the Philippines, comprising Grades 11 and 12 (DepEd).
- **Technical-Vocational-Livelihood (TVL) Track** – A specialization in the Philippine Senior High School curriculum designed to prepare students for employment, entrepreneurship, or further training in specific trades and industries (DepEd).

REVIEW OF RELATED LITERATURE

Artificial Intelligence in Education and Its Growing Influence

Artificial Intelligence (AI) has rapidly become a transformative force in education, reshaping how students learn, teachers instruct, and institutions manage information. Chen et al. (2020) explain that AI enables automation of grading, adaptive instruction, and personalized learning experiences that respond to individual learners' needs.

Similarly, Onyebuchi et al. (2024) emphasized that AI in education promotes customized learning paths, thereby enhancing student engagement and comprehension. Helm et al. (2020) note that AI and machine learning, fueled by big data and deep learning, are poised to transform fields such as medicine.

However, most existing research focuses primarily on the general education or higher education sectors, offering limited insight into its practical application among technical-vocational learners who engage in skill-based instruction. As a result, while AI's theoretical benefits are well-recognized, its effectiveness in hands-on and competency-oriented contexts such as the TVL track remains insufficiently documented.

AI Tools and Student Learning Outcomes

Wu and Yu (2024) conducted a meta-analysis revealing that AI chatbots significantly enhance students' learning outcomes, particularly in short intervention. These tools provide immediate, personalized feedback which can deepen student engagement. Likewise, Kim et al. (2022) demonstrated the potential of AI-supported scaffolding: their AI-Supported Scaffolding (AISS) system helped students build stronger claims and more cohesive written arguments after receiving AI-generated feedback.

Despite these promising results, current literature largely centers on tertiary or online learning environments, leaving little empirical evidence on how AI influences academic performance and engagement in vocational programs. The extent to which AI can improve hands-on technical competencies, rather than purely cognitive learning outcomes, has yet to be sufficiently investigated.

Learner Motivation and Engagement through AI

AI can also influence student motivation and curiosity. Humble et al. (2024) report that tools like ChatGPT spark excitement and offer instant answers, which can boost learners' confidence and interest in exploring new topics. However, they caution that easy access may encourage overreliance on AI, potentially undermining critical thinking and academic integrity. For example, while ChatGPT "provides opportunities for more efficient teaching and learning," it "can be exploited for ill intent, such as cheating" (Özer, 2024).

Song et al. (2024) emphasize that AI learning environments must account for students' diverse backgrounds and interests. Their inclusive framework is anchored by Universal Design for Learning principles and advocates offering multiple motivating avenues for AI activities. By tapping into varied "interests, preferences, and backgrounds," AI instruction can sustain student effort and persistence.

In summary, AI can enhance engagement in theory, but we must ensure these motivational benefits translate to TVL students, whose goals often revolve around practical skill mastery and employability.

Challenges and Ethical Considerations in AI Integration

At the same time, AI raises new challenges in education. Seo et al. (2021) found that while AI systems can enrich communication and support at scale, they may also disrupt classroom norms and privacy. In online settings, students appreciated AI for improving the quantity and quality of interaction, but they also voiced concerns about surveillance, data use, and loss of human connection. In other words, AI can support "just-in-time, personalized support" but risk violating social boundaries.

These findings mirror broader AI-watch warnings: Delipetrev et al. (2020) highlight that integrating AI in public education must confront issues of fairness, bias, and transparency. Gašević et al. (2023) similarly emphasize that ethical guidelines and data governance are essential as AI spreads in schools. Eden, Chisom, and Adeniyi (2024) also highlight that while AI offers transformative opportunities in education, its implementation introduces challenges such as accessibility gaps, data privacy concerns, and potential algorithmic bias, which must be addressed to ensure equitable and ethical learning environments. For technical-vocational training, where teachers closely supervise hands-on work, these concerns are acute. Ensuring the authenticity of student work, maintaining reliable assessments, and providing equal access to AI tools become critical when infrastructure varies across schools.

AI Literacy and Inclusivity in Technical-Vocational Learning

Song et al. (2024) introduced a framework for inclusive AI learning, emphasizing the design of AI curricula that accommodate diverse learners through Universal Design for Learning (UDL). Their work highlights the importance of equity and accessibility in preparing students for AI-driven futures.

Nonetheless, most existing AI literacy initiatives remain conceptual and focused on general K–12 or STEM curricula rather than practical vocational training. Recent research has begun to define the learner capabilities needed for AI education. For example, Sanusi et al. (2022) identify cognitive skills, self-directed learning, human–tool collaboration, skill competence, and ethical reasoning as key factors in students' AI literacy and note that teamwork skills should be explicitly cultivated through collaborative activities.

Similarly, Markauskaite et al. (2022) argue for moving beyond narrow AI-focused literacies to an "ecology" of competencies that includes technological, cognitive, social, and value-oriented capabilities. Learners will need capabilities related to design thinking, ethics, and philosophical reasoning to thrive in an AI-infused world. Integrating these competency-focused perspectives into vocational curricula could help bridge the gap between AI literacy and practical skill development.

Theoretical Framework

This study is grounded on the integration of the Technology Acceptance Model (TAM), Self-Determination Theory (SDT), and Constructivism/Experiential Learning Theory (C/ELT) to explain how Artificial Intelligence (AI) influences the learning experience, motivation, and academic performance of Senior High School students under the Technical-Vocational-Livelihood (TVL) track.

The Technology Acceptance Model (Davis, 1989) serves as the foundation for understanding the level of AI exposure and students' acceptance of AI-based learning tools. It suggests that students' behavioral intention to use technology is influenced by their perception of its usefulness (the degree to which they believe AI improves learning outcomes) and ease of use (how simple and accessible AI tools are). In the context of TVL education, students are more likely to engage with AI technologies (such as virtual simulations, intelligent tutors, or chatbots) if these are seen as beneficial and easy to integrate into practical training. This model supports the first and third objectives of the study: to assess students' exposure to AI tools and determine their relationship with academic performance.

Complementing TAM, the Self-Determination Theory (Deci & Ryan, 2012) explains how AI tools affect student motivation and engagement. According to SDT, motivation increases when learners experience autonomy (control over their learning pace and choices), competence (confidence in their abilities), and relatedness

(connection with peers and instructors). AI-enhanced platforms, through personalized feedback and interactive learning experiences, can satisfy these psychological needs—thereby promoting intrinsic motivation among TVL students. However, when AI is overly prescriptive or inaccessible, it may undermine these motivational factors. This theoretical lens supports the second objective of examining how AI impacts students' motivation and engagement toward learning.

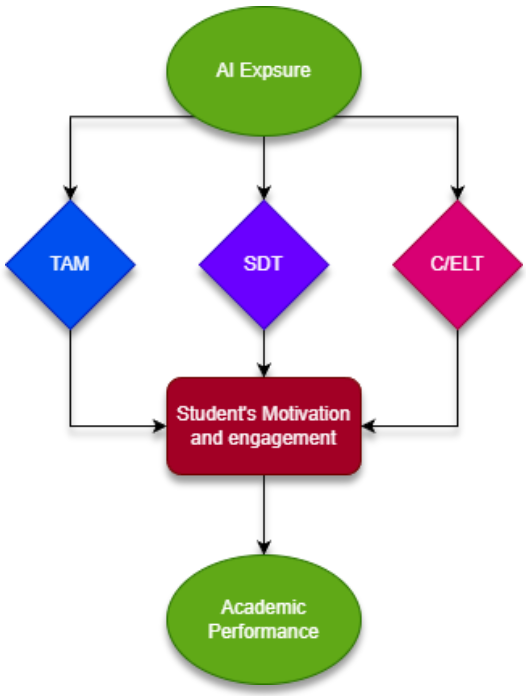


Figure 1: Theoretical Framework Model

Finally, the Constructivism (Piaget & Vygotsky) and Experiential Learning Theory (Kolb, 2013) provides the pedagogical basis for understanding how AI enhances academic performance through hands-on learning experiences. These theories posit that learners build knowledge through active exploration, reflection, and practice. In the TVL track, where education emphasizes "learning by doing," AI-driven applications such as digital simulations, design software, and virtual laboratories allow students to engage in authentic, practice-based learning environments. Through these experiences, learners can construct knowledge and refine their technical competencies in ways that mirror real-world contexts.

Integrating these three theoretical perspectives offers a holistic understanding of AI's educational impact. TAM explains students' readiness and acceptance of AI technologies; SDT elucidates how AI fosters or hinders motivation and engagement; and Constructivist/Experiential Learning Theory clarifies how AI tools enhance skill acquisition and academic performance. Together, they form the foundation for analyzing how AI exposure, usage, and perception influence the overall learning experience of Senior High School TVL students (see figure 1).

Conceptual Framework

This study is anchored on the combined principles of the Technology Acceptance Model (TAM) (Davis, 1989), Self-Determination Theory (SDT) (Deci & Ryan, 2012), and Constructivist and Experiential Learning Theory (Piaget & Vygotsky; Kolb, 2013). These theories collectively describe how learners' exposure to Artificial Intelligence (AI) tools influences their motivation, engagement, and academic performance which factors essential to the learning experience of Senior High School students under the Technical-Vocational-Livelihood (TVL) track.

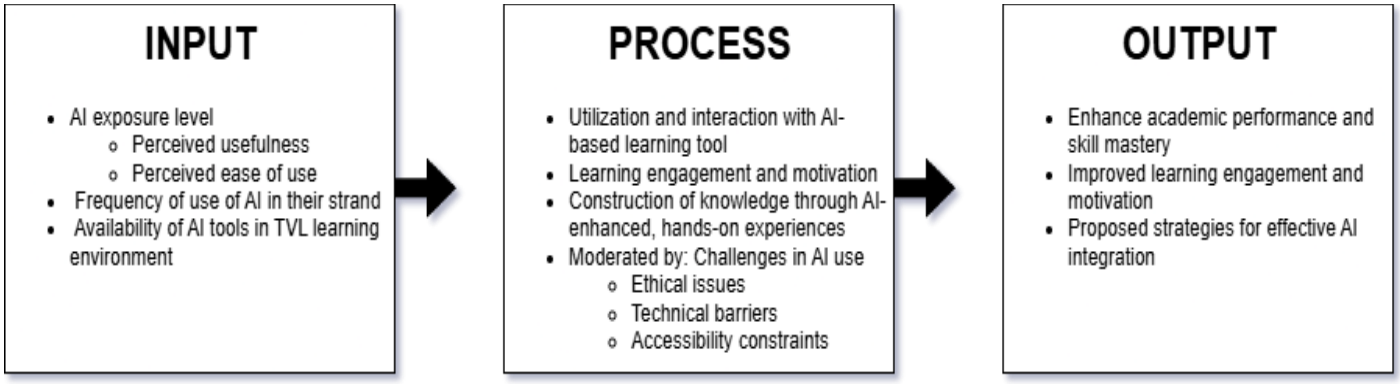
According to the Technology Acceptance Model, the degree of a learner's exposure to and acceptance of AI tools depends on two key beliefs: perceived usefulness and perceived ease of use. When students view AI as helpful and accessible, they are more likely to adopt it in their studies (Chen et al., 2020; Ayeni et al., 2024). In the

context of TVL education, this reflects how students interact with intelligent tutoring systems, digital simulations, or chatbots designed to enhance learning outcomes.

The Self-Determination Theory explains that learner motivation and engagement are driven by the fulfillment of autonomy, competence, and relatedness (Deci & Ryan, 2012). AI applications can support these psychological needs through adaptive feedback, self-paced tasks, and collaborative learning environments (Song et al., 2024; Humble et al., 2024). However, overreliance or inequitable access may hinder intrinsic motivation and discourage active participation.

Finally, Constructivist and Experiential Learning perspectives (Piaget & Vygotsky, 1978; Kolb, 2013) emphasize that learners acquire knowledge through active exploration and practice. AI-powered simulations and hands-on virtual laboratories enable TVL students to "learn by doing," which strengthens both conceptual understanding and practical competence. These approaches directly influence academic performance by providing authentic, interactive learning experiences aligned with real-world technical tasks.

Figure 2: Conceptual Framework Model



Synthesizing these theories, this study conceptualizes that AI exposure and acceptance (independent variable) affect students' motivation and engagement (intervening variables), which in turn influence their academic performance (dependent variable). Additionally, challenges in AI use such as ethical, technical, or accessibility issues (Seo et al., 2021; Delipetrev et al., 2020), may moderate these relationships. The findings will guide the development of strategies to maximize AI's positive effects on TVL learners (see figure 2).

METHODOLOGY

Research Design

This study will employ a quantitative descriptive-correlational research design to examine the effects of Artificial Intelligence (AI) integration on the academic performance, learning engagement, and motivation of Senior High School students under the Technical-Vocational-Livelihood (TVL) track.

The descriptive component aims to identify the level of AI exposure and describe learners' experiences in using AI tools, while the correlational component seeks to determine the relationship between the level of AI exposure and students' academic performance. This approach is suitable for identifying patterns, relationships, and effects without manipulating any variables, thereby providing an objective view of AI's educational impact.

Research Locale

The study will be conducted at Bagbag Solsona National High School, located in Brgy. #18 Bagbag, Solsona, Ilocos Norte. The school offers several Technical-Vocational-Livelihood (TVL) strands such as Technical Drafting and Computer System Servicing. These strands provide an ideal environment to explore how Artificial Intelligence (AI) tools influence students' technical skills development, problem-solving ability, and learning motivation in skill-based learning contexts.

Population and Sampling Technique

The study will target Grade 12 Senior High School students enrolled in the TVL track during the Academic Year 2025–2026. The total population will be determined through the school registrar's records. To obtain a representative sample, the Slovin's formula (see figure 3) will be applied with a margin of error of 0.05.

Although the sample was drawn from a single institution, the respondents represent almost the entire TVL student population of the school (56 out of 62 learners). This ensures strong contextual representation and reliability of the findings within the research locale. The study therefore provide s meaningful insights into AI use among TVL learners, particularly in settings where access to digital resources may vary.

$$n = \frac{N}{1 + Ne^2}$$

n = sample size
N = total population
e = margin of error

Figure 3: Slovin's Formula

After determining the sample size, a stratified random sampling method will be applied to ensure that both CSS and TD strands are proportionally represented in the study. This approach allows balanced insights into how AI affects learners across the two technical areas.

Research Instrument

The study will use a **structured survey questionnaire** developed by the researcher and validated by experts in education, information technology, and technical-vocational instruction. The instrument will consist of four parts:

1. **Part I – Respondents' Profile:** Gathers demographic information such as strand, age, gender and frequency of AI use.

2. **Part II – Level of Exposure to AI Tools:** Measures students' familiarity and frequency of using AI-based learning tools (e.g., chatbots, virtual labs, intelligent tutoring systems) using a 5-point Likert scale (Never to Always).

3. **Part III – Perceived Effects of AI Use:** Evaluates the influence of AI on:

- Academic performance
- Learning engagement
- Motivation toward learning

Items will be rated using a 5-point Likert scale (Strongly Disagree to Strongly Agree).

Part IV & V – Challenges and Strategies: Identifies challenges encountered by students in using AI and gathers their suggestions for improving AI integration in TVL learning.

The questionnaire will utilize a 5-point Likert scale to measure responses in part I, II and III, as this format provides a balanced range of options from strong disagreement to strong agreement while including a neutral midpoint. This ensures that respondents are not forced to choose between agreement or disagreement, thereby reducing bias and capturing more accurate perceptions. Its reliability will be assessed using Cronbach's alpha (acceptable coefficient: ≥ 0.70)

Data Gathering Procedure

The data gathering procedure for this study will begin with seeking approval and permission from the school principal of Bagbag Solsona National High School to formally conduct the research. Once approval is granted, the researcher will proceed with the administration of the survey questionnaires to the selected Grade 12 students from both Technical-Vocational-Livelihood (TVL) strands (Computer System Servicing and Technical Drafting).

The surveys may be conducted either through printed copies or digitally via Google Forms, depending on the accessibility and convenience of the respondents. After the survey administration, the collected responses will be compiled, organized, and encoded for statistical analysis. The gathered data will then be treated and analyzed using appropriate statistical tools to interpret the findings accurately and meaningfully.

Throughout the entire data collection process, participants will be fully informed of their rights, and strict confidentiality and anonymity of all responses will be maintained to uphold ethical research standards.

Ethical Considerations

This research strictly follows the ethical standard in conducting research. Prior to the data collection, researcher will secure all formal approval from the school of Bagbag Solsona National High School. Respondents will be informed about the purpose of the study and their voluntary participation through an informed consent statement included in the questionnaire.

Participants will be assured that the following will be followed:

1. Voluntary Participation: students may withdraw or refuse to answer any item without any penalty.

2. Confidential and anonymity: all digital responses (if using Google Forms) and printed questionnaires will be stored securely and accessible only to the researcher. Data will not be shared with unauthorized individuals.

3. Non-maleficence: No physical, psychological, or academic risks are associated with participation.

4. Ethical Compliance: The study will follow the principles of respect, beneficence, and justice to ensure that all participants are treated fairly.

Upon completion of the study, all raw data will be disposed of responsibly to protect participants' privacy.

Data Analysis, Interpretation and Presentation

The data gathered from the survey questionnaires will be systematically analyzed to address the research objectives of the study. Quantitative data from Part I, Part II, Part III, and Part IV of the questionnaires will be encoded and analyzed using descriptive and inferential statistics. Descriptive statistics such as frequency counts, percentages, means, and standard deviations will be used to determine the level of exposure to AI tools and the perceived effects on academic performance, learning engagement, and motivation.

In addition to descriptive statistics, inferential analysis was conducted using Pearson's correlation coefficient to determine the relationship between students' level of AI exposure and academic performance. Statistical significance was tested at the 0.05 level. This approach strengthens the study by examining not only trends in AI usage but also the degree to which exposure is associated with learning outcomes.

Qualitative data, gathered from Part V of the questionnaire where students provide written recommendations and suggestions, will be analyzed thematically. Responses will be categorized, coded, and summarized to identify common themes and insights regarding challenges encountered in using AI tools and strategies to maximize AI's positive impact on learning.

The interpretation of results will integrate both quantitative findings and qualitative insights to provide a comprehensive understanding of how AI tools influence the academic performance, engagement, and motivation of Senior High School TVL students. Findings will be presented using tables, charts, and narrative descriptions to ensure clarity, highlight trends, and effectively communicate both statistical outcomes and students' perspectives.

This mixed-methods approach ensures that the study not only quantifies the effects of AI tools but also contextualizes them through the learners' own experiences and recommendations, providing actionable insights for educators, administrators, and future researchers.

RESULTS AND ANALYSIS

Summary of the Findings

The participants in this study consisted of 56 Senior High School students from the Technical-Vocational-Livelihood (TVL) track, out of a total population of 62 students. The sample size was determined using Slovin's Formula, which calculated a minimum required sample of approximately 54 respondents; therefore, the 56 participants sufficiently met and exceeded this requirement, ensuring reliable and representative data. Of these participants, 76.79% were enrolled in the Computer System Servicing (CSS) strand, while 23.21% were in the Technical Drafting (TD) strand. In terms of gender distribution, 51.79% were male and 46.43% were female, with an average age of 17.23 years.

For clarity and organized presentation, the results are arranged according to the sequence of the research questionnaire, beginning with the respondents' profile, followed by their level of AI exposure, the perceived effects of AI on learning, and finally, the identified challenges and proposed strategies for improving AI integration in TVL education.

Part I: Respondent's Profile

Part I of the questionnaire asked students, "How often do you use AI tools in your studies?" The results reveal that most of the students reported a moderate level of AI tool usage in their academic activities. Most respondents selected "Sometimes" (64.29%), indicating that AI use has become a common part of their learning routine, though not utilized continuously. Meanwhile, 17.86% reported using AI tools "Often," and 12.50% selected "Always," showing that a notable portion of learners frequently rely on AI for completing academic tasks. Only 5.36% chose "Rarely," and none selected "Never," confirming that AI usage is widespread among the participants (see figure 4).

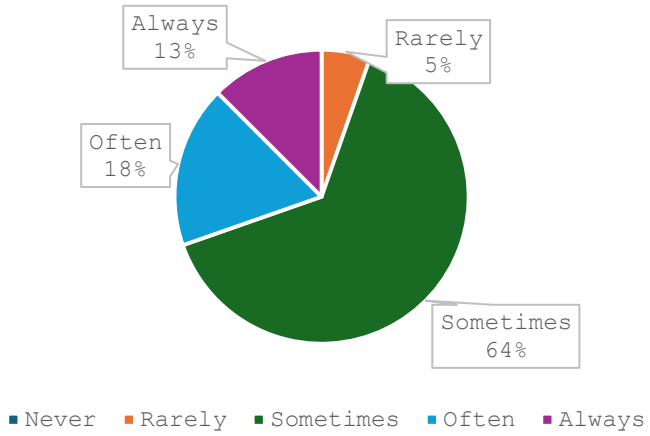


Figure 4: Students' AI Tool Usage frequency

The computed mean of 3.38 reinforces that students' use of AI tools generally falls within the moderate-to-frequent range. Furthermore, the standard deviation of 0.77 indicates minimal variation in responses, showing that students share relatively similar levels of AI engagement. Overall, the findings illustrate that AI tools have

become an integral part of students' study habits, regularly used for gaining information, supporting coursework, and enhancing overall learning experiences.

Part II: Level of Exposure to AI-Based Learning Tools

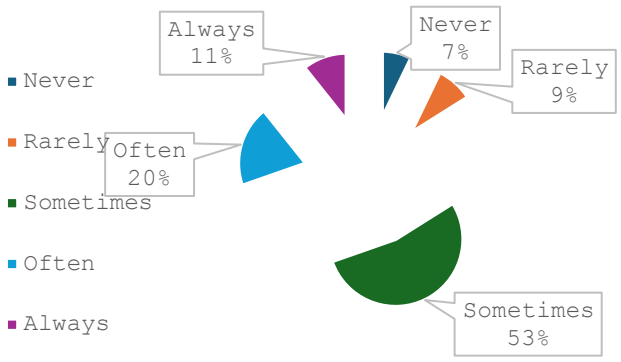


Figure 5: Use of ChatGPT and AI Tools for Learning and assignments

The use of ChatGPT and other AI chatbots for learning or assignments reflects a moderate level of engagement among students. Most respondents selected "Sometimes" (53.57%), followed by "Often" (19.64%) and "Always" (10.71%), indicating that many learners regularly rely on chatbots to support their academic tasks. Meanwhile, 7.14% reported "Rarely" and 8.93% selected "Never." The mean score of 3.18 and standard deviation of 0.99 confirm that while the overall usage is moderate, students' engagement levels vary widely (see figure 5).

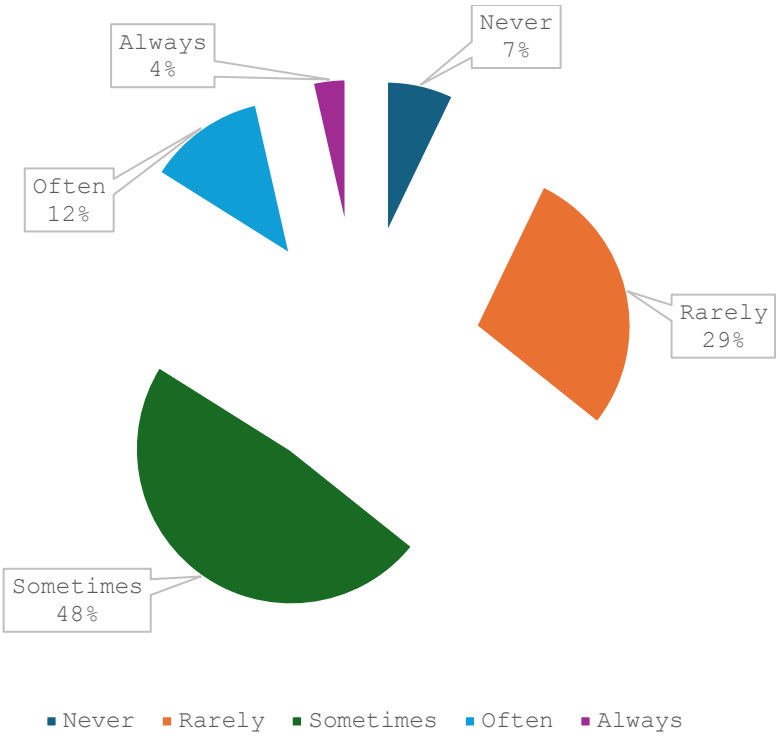


Figure 6: Use of Virtual Laboratories and AI Simulations

Virtual laboratories and AI simulations for practical tasks also show moderate but less frequent use. Nearly half of the respondents selected "Sometimes" (48.21%), while 28.57% chose "Rarely." Only a smaller portion reported "Often" (14.29%) or "Always" (8.93%), and none reported "Never." With a mean of 2.77 and a standard deviation of 0.89, the results indicate that students use these tools occasionally, mainly as supplementary resources rather than primary learning platforms (see figure 6).

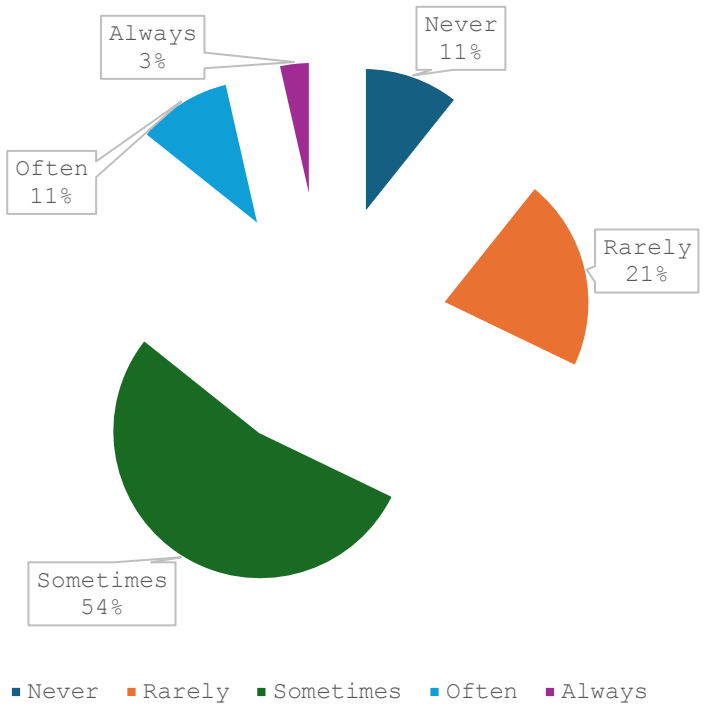


Figure 7: Use of AI-Based Tutoring Systems and Apps

For AI-based tutoring systems or smart learning applications—such as adaptive quizzes or intelligent learning platforms, the majority selected "Sometimes" (53.57%), while 21.43% answered "Rarely." Only 14.29% reported "Often" and 3.57% selected "Always." The mean of 2.75 and standard deviation of 0.92 suggest moderate but inconsistent usage, showing that while these tools benefit some students, others rely on them only occasionally (see figure 7).

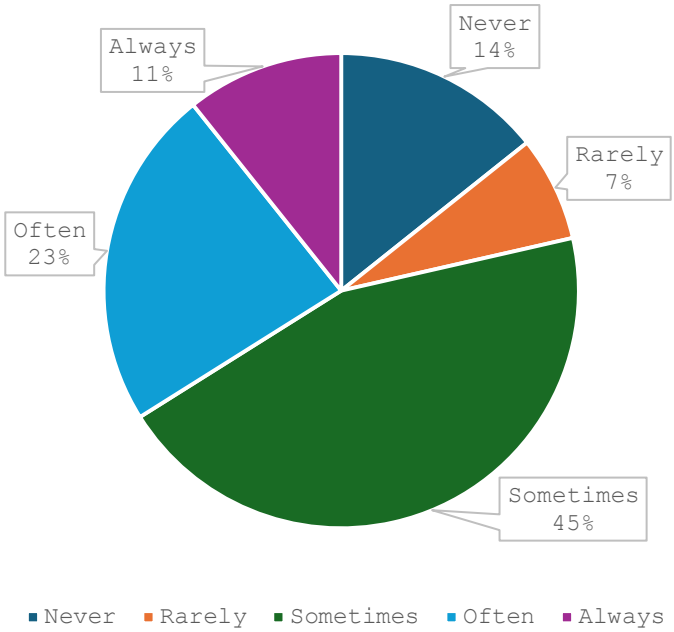


Figure 8: Use of AI-Powered Translation and Writing Assistants

The use of AI-powered translation or writing assistants, including Grammarly and QuillBot, shows wider variability. Most respondents chose "Sometimes" (44.64%), followed by "Often" (23.21%) and "Always" (10.71%). Lower usage was reported under "Rarely" (7.14%) and "Never" (14.29%). The computed mean of 3.09 and relatively higher standard deviation of 1.15 indicate moderate engagement overall but with noticeable differences in individual reliance on these writing tools (see figure 8).

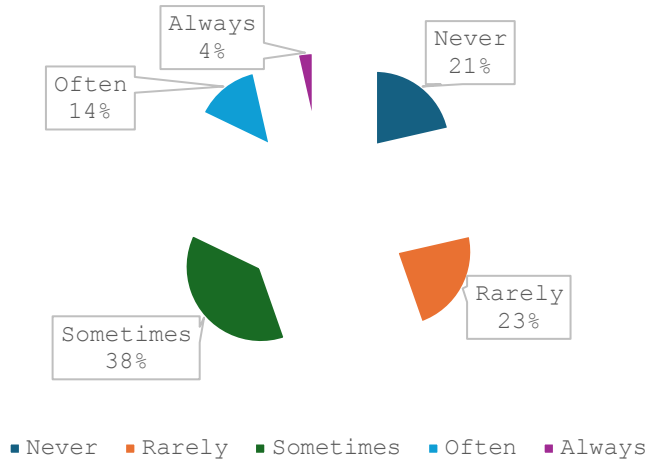


Figure 9: Use of AI-Integrated Tools for Technical and Design Tasks

Lastly, AI-integrated tools for technical or design tasks (such as Canva AI, or Gemini) record the lowest level of usage among the categories. While 37.50% responded "Sometimes," a combined 44.64% selected "Rarely" (23.21%) or "Never" (21.43%), and only a few chose "Often" (14.29%) or "Always" (3.57%). The mean of 2.55 and standard deviation of 1.09 confirm low-to-moderate usage, suggesting that although some students use AI for technical or design purposes, many access these tools infrequently or not at all (see figure 9).

Part III: Perceived Effects of AI Use

The goal of this part of the questionnaire is to examine the effects of AI use on students' academic performance, learning engagement, and motivation towards learning. To make it easier to follow, the results are organized according to the specific areas addressed in the questionnaire: academic performance, learning engagement, and motivation. Frequency counts, percentages, means, and standard deviations were computed to summarize the responses of the participants.

Academic Performance

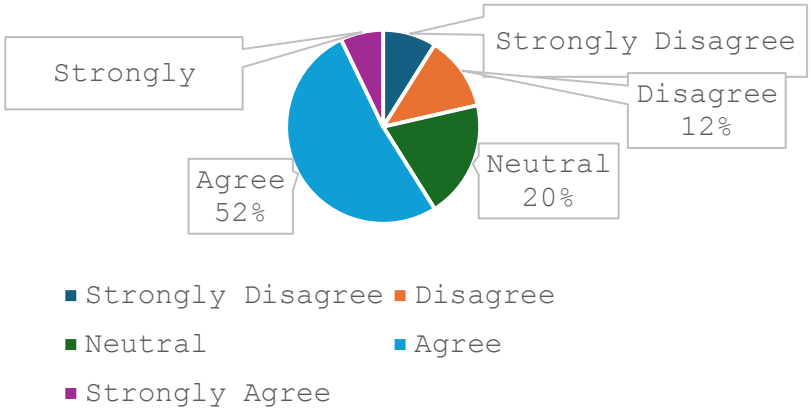


Figure 10: Impact of AI in Students' Academic Performance

AI has a direct effect on the students' academic performance. In this finding, 51.79% of respondents said AI helps them complete assignments, 19.64% were neutral, 8.93% disagreed, 8.93% strongly disagreed, and 7.14% strongly agreed. The mean score of 3.36 and standard deviation of 1.09 indicate moderate agreement with some variability, showing that while many students rely on AI, others use it less or not at all (see figure 10).

Regarding the use of AI to improve the quality of school projects and outputs, 33.93% agreed, 35.71% were neutral, 12.50% disagreed, 10.71% strongly disagreed, and 7.14% strongly agreed. The mean of 3.14 and

standard deviation of 1.09 indicate overall moderate agreement, suggesting that although many students perceive AI as helpful in enhancing their projects, others use it less frequently or are unsure of its benefits (see figure 11).

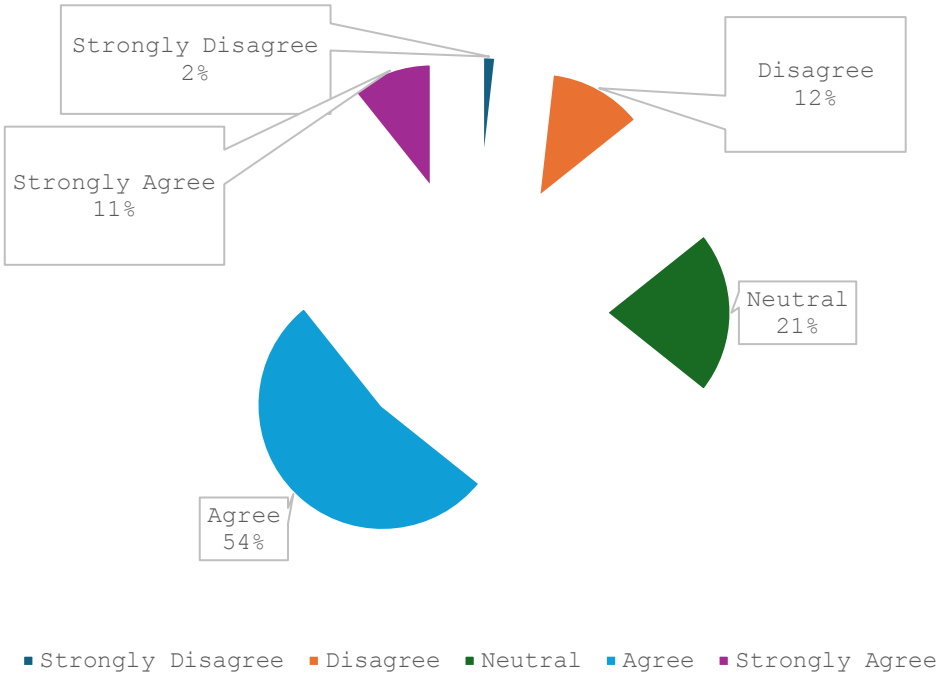


Figure 11: Impact of AI on Quality of School Projects

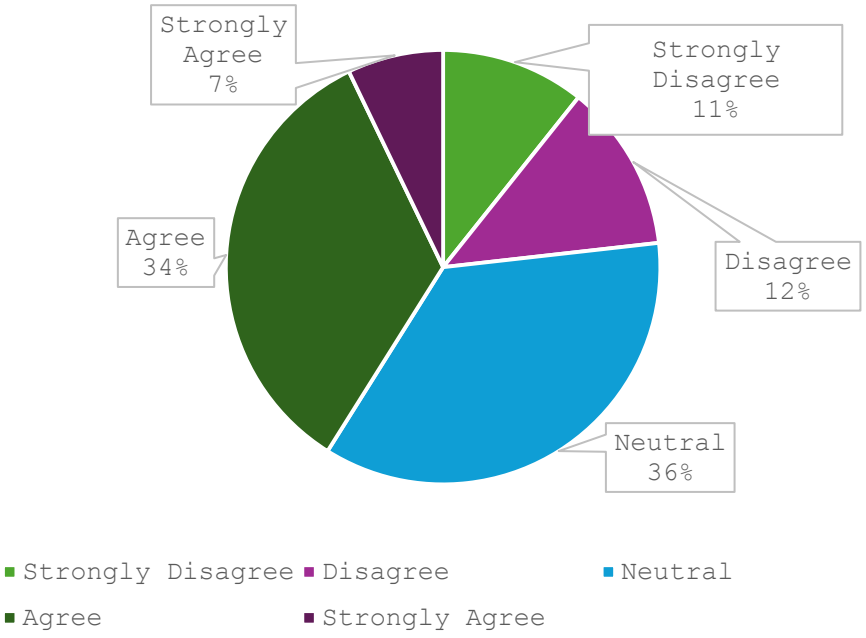


Figure 12: Impact of AI on Understanding Complex Technical Concept

For understanding complex technical concepts, 53.57% of respondents agreed that AI is helpful, 21.43% were neutral, 12.50% disagreed, 10.71% strongly agreed, and 1.76% strongly disagreed. The mean of 3.56 and standard deviation of 0.91 indicate moderate to high agreement with relatively low variability, showing that most students find AI useful in grasping technical concepts (see figure 12).

Concerning the ease and efficiency of learning tasks, 39.29% of respondents agreed, 37.50% were neutral, 3.57% disagreed, 14.29% strongly disagreed, and 5.36% strongly agreed. The mean of 3.18 and standard deviation of 1.10 suggest moderate agreement with some variability, indicating that while many students find AI helpful in streamlining learning tasks, others are less convinced or use it minimally (see figure 13).

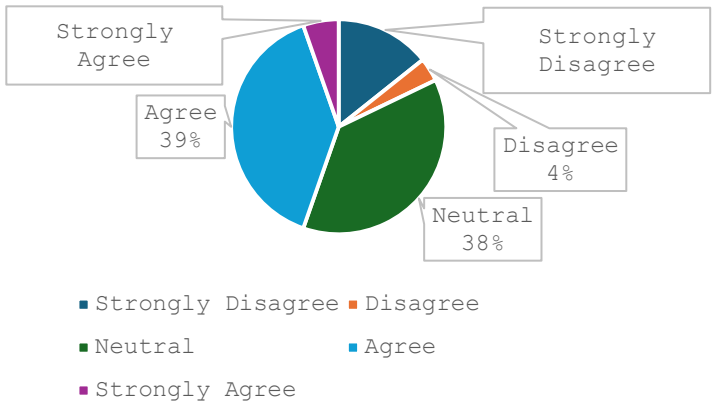


Figure 13: Impact of AI on Ease and Efficiency of Learning Tasks

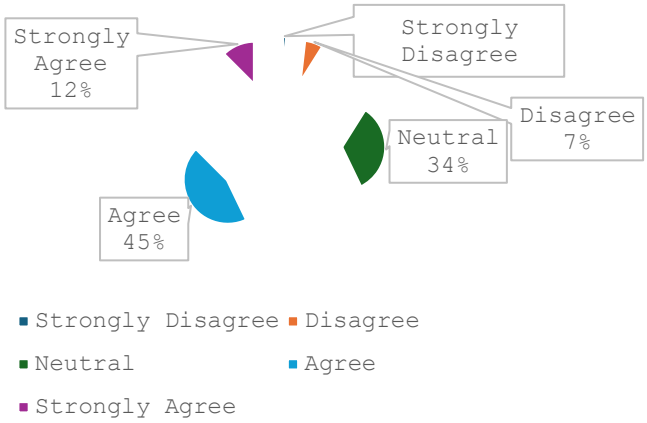


Figure 14: Impact of AI on Performance in TVL Subjects

Lastly, 44.64% of respondents agreed that AI helps them perform better in their TVL subjects, 33.93% were neutral, 7.14% disagreed, 12.50% strongly agreed, and 1.79% strongly disagreed. The mean of 3.59 and standard deviation of 0.87 indicate moderate to high agreement with relatively low variability, suggesting that most students perceive AI as beneficial for improving their performance in TVL subjects (see figure 14).

Leaning Engagement

Most of the students have a neutral relationship with AI in their learning engagement. In terms of whether AI tools make learning more interactive and enjoyable, 42.43% remained neutral, followed by 26.79% who agreed. Meanwhile, 17.86% disagreed, 8.93% strongly disagreed, and another 8.93% strongly agreed. The mean of 2.98 and standard deviation of 0.98 indicate overall neutrality with moderate variability, suggesting that while some students find AI engaging, many are unsure or do not consistently experience increased enjoyment in their learning (see figure 15).

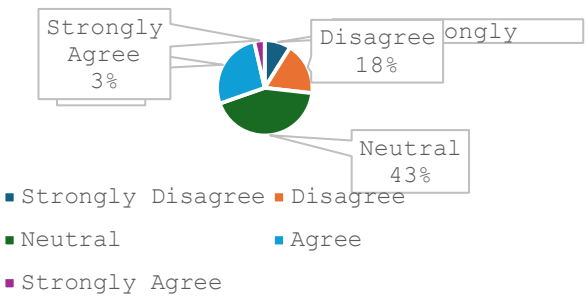


Figure 15: Impact of AI on Learning Engagement

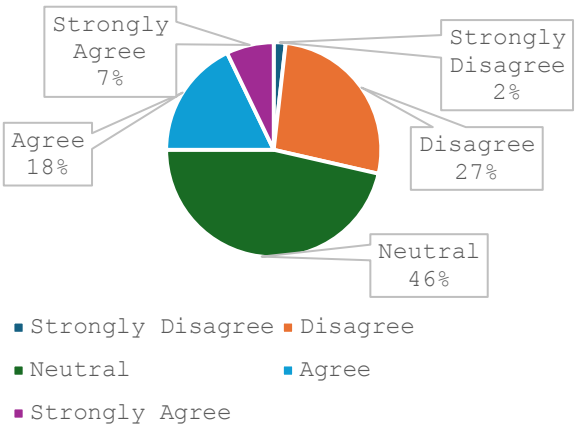


Figure 16: Impact of AI on Students' interest Learning

Similarly, students showed a neutral response regarding whether AI increases their interest in learning. A majority of 46.43% remained neutral, followed by 26.79% who disagreed and 17.86% who agreed. Additionally, 7.14% strongly agreed, while only 1.79% strongly disagreed. The mean of 3.02 and standard deviation of 0.90 indicate overall neutrality with relatively low variability, suggesting that AI does not consistently increase students' interest, although some learners still perceive its benefits (see figure 16).

Furthermore, overall neutrality is evident in students' active participation when AI is integrated into class activities. A large portion of students (57.14%) remained neutral, 26.79% agreed, and 16.07% disagreed. In addition, 3.57% strongly agreed and another 3.57% strongly disagreed. The mean of 3.04 and standard deviation of 0.81 reflect general neutrality with low variability, indicating that AI does not significantly influence students' participation in class (see figure 17).

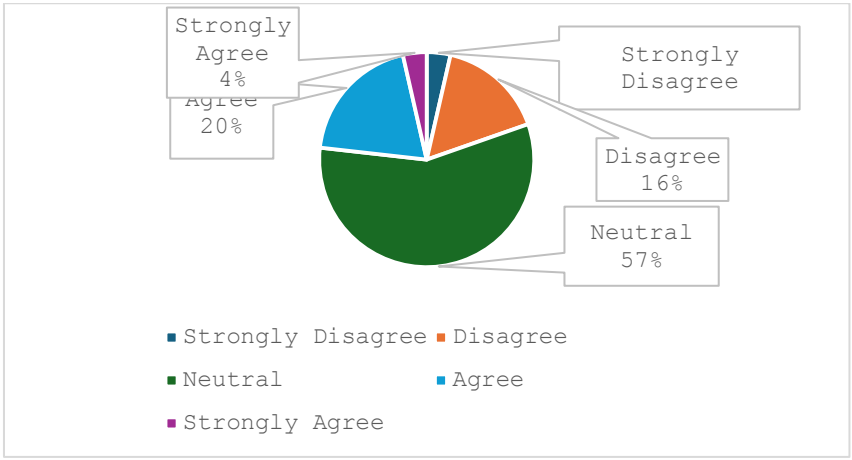


Figure 17: Impact of AI on Students' Participation in Class Activities

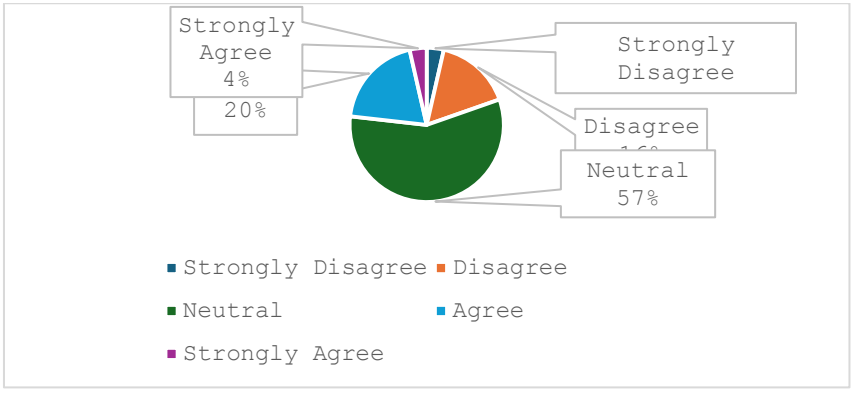


Figure 19: Impact of AI on Students' Focus During Learning

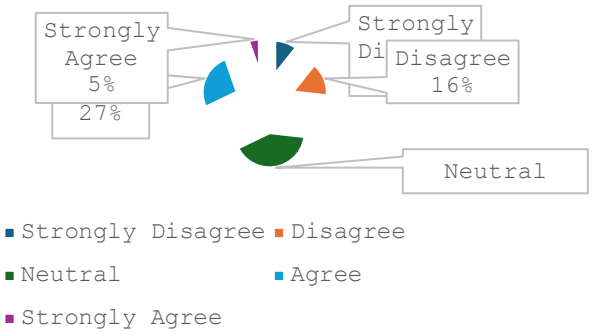


Figure 20: Impact of AI on Students' Motivation to Initiate Learning

Students also showed neutrality regarding whether AI tools encourage them to explore beyond what is taught in class. A total of 41.43% remained neutral, 26.79% agreed, 16.07% disagreed, and 10.71% strongly disagreed, while 5.36% strongly agreed. The mean of 3.00 and standard deviation of 1.04 show overall neutrality with moderate variability, suggesting that AI does not consistently motivate students to extend their learning beyond classroom instruction (see figure 18).

Lastly, neutrality is also evident in whether students feel more focused when using AI in their learning. A majority (46.43%) remained neutral, while 25% agreed and another 25% disagreed. Only 1.79% strongly agreed and 1.79% strongly disagreed. The mean of 3.00 and standard deviation of 0.81 indicate overall neutrality with low variability, implying that AI does not significantly enhance or reduce students' focus during learning (see figure 19).

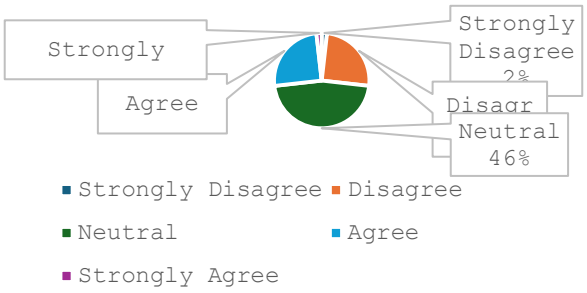


Figure 22: Impact of AI in Students' Confidence in Technical Skills

Motivation Towards Learning

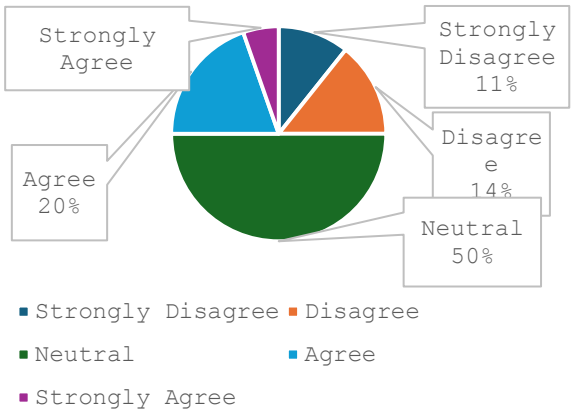


Figure 23: Impact of AI in Students' Eagerness to Learn New Skills

Neutrality in learning engagement is also evident in students' motivation toward learning. Half of the respondents (50%) remained neutral about whether AI encourages them to take initiative in their own learning, while 19.64%

agreed. On the other hand, 11.29% disagreed and 10.71% strongly disagreed, with only 5.36% strongly agreeing. The mean of 2.95 and standard deviation of 1.00 indicate overall neutrality with moderate variability, suggesting that AI does not consistently motivate students to initiate their learning (see figure 20).

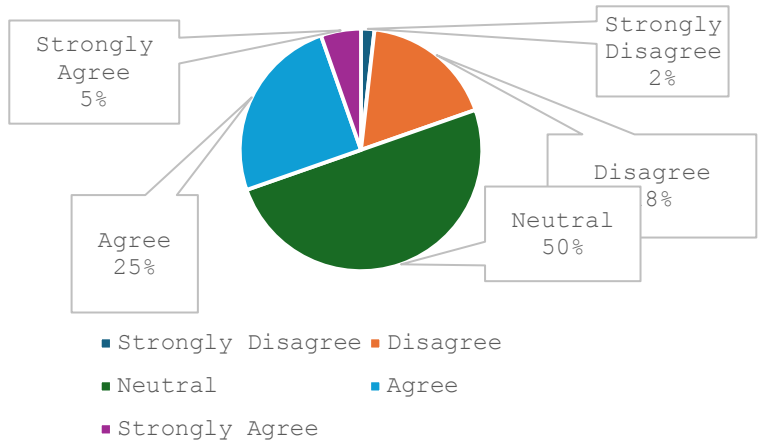


Figure 24: Impact of AI in Students' Satisfaction on Completing Task

Regarding personalized feedback from AI, 50% of respondents remained neutral, 25% agreed, and 17.86% disagreed. Additionally, 5.36% strongly agreed, while 1.79% strongly disagreed. The mean of 3.14 and standard deviation of 0.84 indicate a generally neutral response with low variability, showing that while some students find AI feedback motivating, many are unsure of its impact (see figure 21).

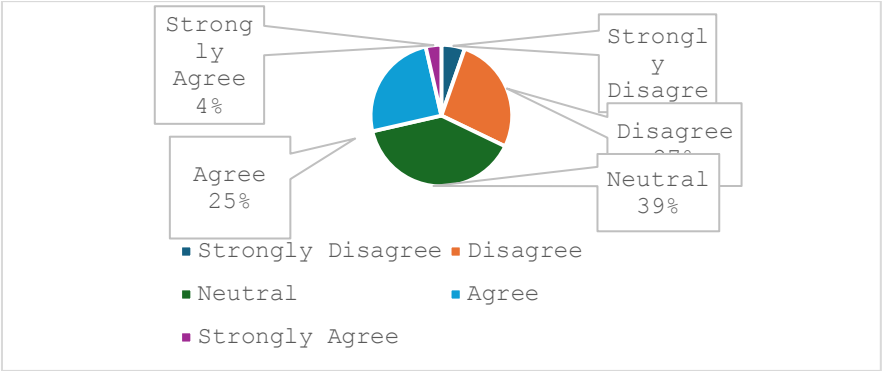
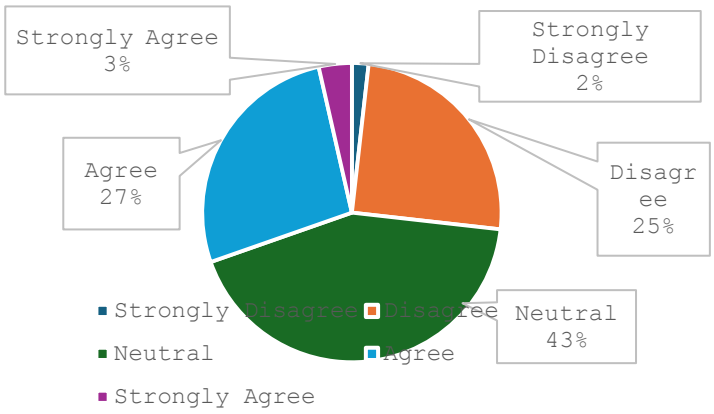
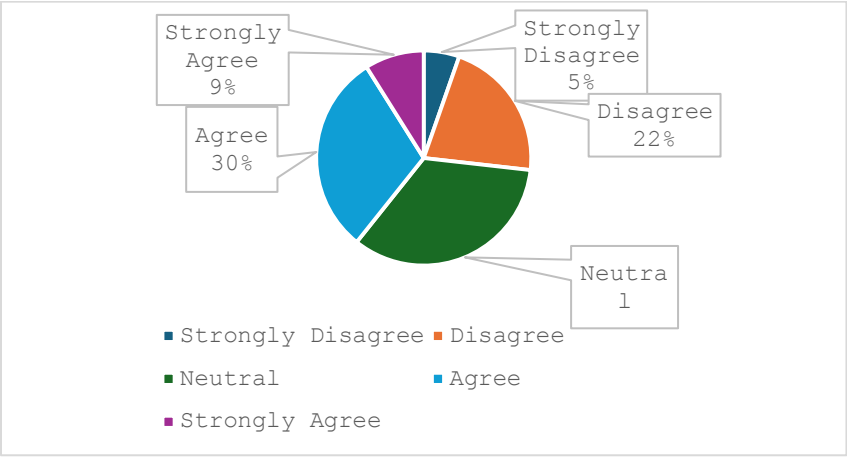


Figure 21: Impact of Personalized Feedback from AI to Students

In terms of confidence in students' technical skills using AI, 39.29% of respondents were neutral, 26.79% disagreed, and 25% agreed. Meanwhile, 5.36% strongly disagreed and 3.57% strongly agreed. The mean of 2.95 and standard deviation of 0.94 indicate overall neutrality with moderate variability, suggesting that AI does not consistently enhance students' confidence in acquiring new skills (see figure 22).



Similarly, neutrality is evident in students' eagerness to learn new skills in their strands, with 42.86% remaining neutral. Meanwhile, 26.79% agreed and 25% disagreed, while 3.57% strongly agreed and 1.79% strongly disagreed. The mean of 3.05 and standard deviation of 0.86 reflect overall neutrality with low variability, suggesting that AI does not strongly influence students' eagerness to acquire new skills (see figure 23).



Lastly, students' satisfaction when successfully using AI to complete a task also shows neutrality. A total of 33.93% remained neutral, 30.36% agreed, 21.43% disagreed, 8.93% strongly agreed, and 5.36% strongly disagreed. The mean of 3.16 and standard deviation of 1.04 indicate overall neutrality with moderate variability, suggesting that while some students feel satisfied when using AI effectively, others are less certain about its impact (see figure 24).

Part IV: Challenges in Using AI Tools

This section asked respondents about the difficulties or obstacles they encounter when using AI tools in their learning activities. The findings reveal several key challenges faced by TVL students:

The most reported challenge was limited internet access (31.21%), indicating that connectivity issues remain a major barrier to consistent AI use. This was followed by lack of available AI tools in school (14.89%) and overreliance on AI for schoolworks (14.18%), showing that while tools are valued, both access and dependency can impact learning outcomes. Difficulty understanding AI instructions (13.48%) and ethical concerns, such as academic honesty (13.48%), were also noted, highlighting the need for guidance in proper and responsible AI usage. Lastly, lack of teachers' guidance in using AI (12.77%) underscores the importance of instructional support to maximize the benefits of AI integration (see figure 25).

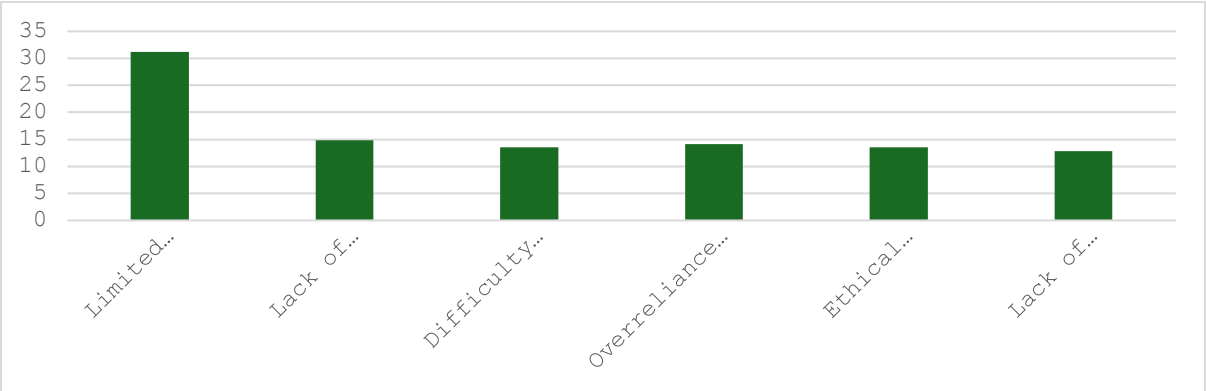


Figure 25: Challenges in Using AI Tools

Overall, these results indicate that while AI tools are increasingly used, TVL students face a combination of technical, instructional, and ethical challenges that must be addressed to ensure effective and equitable use of AI in learning.

Part V: Recommendations and Suggestions on AI Use in TVL Learning

Respondents highlighted that schools could improve students' use of AI tools by providing AI literacy training, workshops, and seminars focused on responsible use, critical evaluation, and practical application. They suggested that AI instruction should include ethical considerations and teach students how to properly integrate AI into their learning, ensuring that tools enhance rather than replace critical thinking and hands-on skills. Access to reliable internet and school-provided AI resources was also emphasized as necessary to maximize the benefits of these technologies.

Teachers were encouraged to integrate AI effectively into TVL learning activities by using AI-powered tools for personalized instruction, real-time feedback, and skill-based simulations. Respondents noted that AI could assist in creating interactive learning experiences, such as virtual labs, project guidance, and step-by-step tutorials, while maintaining the focus on practical competencies and employability. They stressed that teachers' guidance is crucial in helping students use AI responsibly and effectively, particularly in skill-oriented tasks in strands like Computer System Servicing and Technical Drafting.

Students also shared their preferences for specific AI tools and support that would enhance learning. Popular tools included ChatGPT, Gemini, CiCi, and Canva AI, which they found useful for completing assignments, understanding technical concepts, and improving project quality. They recommended tools that provide instant feedback, step-by-step guidance, and personalized learning paths, especially those aligned with their specific TVL strands. Overall, the suggestions reflect a desire to combine AI's efficiency with guided, ethical, and skill-focused learning, providing insights for schools and teachers to optimize AI integration in technical-vocational education.

Interpretation of Result

The findings reveal that AI tools are moderately integrated into the academic routines of TVL students. Most students use AI occasionally to support learning tasks, but consistent daily use remains limited. Chatbots and intelligent tutoring apps are more commonly used, while AI tools for technical/design tasks are less frequent, likely due to accessibility issues or lack of familiarity.

AI positively affects academic performance, particularly in understanding technical concepts and completing projects efficiently. However, its influence on learning engagement and motivation is generally neutral, suggesting that while AI can supplement learning, it does not inherently increase interest, focus, or initiative without structured guidance.

Challenges such as limited internet access, insufficient AI tools, and lack of teacher guidance indicate structural and instructional barriers. Ethical concerns and overreliance highlight the need for responsible AI use. Students' recommendations emphasize training, curriculum integration, and guided use, demonstrating a desire to combine AI efficiency with practical, skill-oriented learning. Overall, these results suggest that AI has potential to enhance TVL education if supported by infrastructure, teacher facilitation, and proper instructional design.

DISCUSSION

Discussion

The level of AI exposure among TVL students in this study appears to be moderate, based on their reported use of various AI tools. Students indicated that they commonly use AI chatbots, writing assistants, and general productivity applications, often selecting "sometimes" or "often" as their frequency of use. This pattern suggests that AI has become a regular part of their study routines, particularly for writing tasks, information searching, and basic academic assistance. However, tools that are more closely connected to TVL competencies, such as virtual laboratories, simulations, and AI design software, were used less frequently. This indicates that while AI is already present in the students' learning environment, its application in specialized technical areas remains limited. Differences in standard deviation across categories also show that AI exposure varies among students, likely due to unequal access to resources or inconsistent experience with digital technologies.

The findings further show that AI use has a generally positive relationship with students' academic performance. Students moderately agreed that AI helps them complete assignments more accurately, improve the quality of their projects, and understand difficult technical concepts. They also acknowledged that AI tools make learning tasks more manageable and contribute to better performance in their TVL subjects. These results suggest that AI supports students in content mastery and task execution. However, in terms of learning engagement, responses were mostly neutral. Many students were uncertain whether AI makes learning more interactive, enjoyable, or participatory. Similarly, their motivation toward learning also reflected overall neutrality. Students did not strongly indicate that AI increases their confidence, initiative, or eagerness to acquire new skills. These findings imply that while AI may enhance cognitive performance, it does not automatically translate into greater engagement or motivation unless supported by effective instructional strategies.

The neutral responses on engagement and motivation may reflect the competency based and hands on nature of the TVL track. Unlike academic subjects where AI tools may directly enhance interest through digital interaction, TVL learners often rely more on practical application, physical performance tasks, and teacher guided demonstrations. Therefore, AI may assist with academic completion and understanding, but it may not significantly increase engagement or motivation unless intentionally integrated into skill based activities and experiential learning environments.

Students also identified several challenges that limit their ability to maximize AI tools for learning. Limited internet access emerged as the most common difficulty, showing that connectivity remains a major barrier in using web based AI applications. Other concerns included the lack of available AI tools in school, difficulty interpreting AI generated instructions, and insufficient teacher guidance. Ethical issues such as the risk of plagiarism and overreliance on AI were also noted, suggesting that some students remain uncertain about responsible and appropriate use. These challenges highlight the need for improved digital infrastructure, stronger instructional support, and clearer guidelines on ethical AI use in educational settings.

To address these challenges, students recommended strategies that may strengthen AI integration in TVL learning. They emphasized the importance of AI literacy training, workshops, and seminars focused on responsible and effective use. They also suggested improving internet connectivity and providing more AI tools within the school to expand student access. From an instructional perspective, students recommended that teachers use AI to deliver personalized feedback, support practical tasks, and create interactive learning experiences (such as virtual labs and simulated activities). They also expressed interest in tools like ChatGPT, Gemini, CiCi, and Canva AI, which they find helpful for completing assignments and improving outputs. These recommendations reflect a shared desire for a learning environment where AI is accessible, guided, and aligned with the technical and practical nature of the TVL track.

CONCLUSION

The study concludes that AI tools play a growing but still moderate role in the academic experiences of TVL students. While students frequently use AI chatbots and tutoring systems to support assignments and clarify subject-specific concepts, their engagement with these tools tends to be moderate and occasional rather than consistent (Labadze et al, 2023;Song et al., 2025). Research indicates that AI tools positively contribute to students' academic performance by enhancing understanding, providing personalized feedback, and supporting task completion (Wu & Yu, 2024; Kim et al., 2022; Chen et al., 2020). However, their influence on learning engagement and motivation appears generally neutral, as AI alone does not consistently sustain interest or initiative without structured instructional support and guided implementation (Humble et al., 2024; Özer, 2024; Song et al., 2024; Sanusi et al., 2022). This highlights the need for teachers to integrate AI thoughtfully into learning activities to maximize both performance and sustained engagement.

Challenges such as limited internet connectivity, insufficient access to AI resources, and gaps in teacher guidance underscore the need for stronger technological infrastructure and pedagogical support systems (Seo et al., 2021; Delipetrev et al., 2020; Gašević et al., 2023). Additionally, ethical concerns and the risk of overreliance on AI highlight the importance of promoting responsible and guided use, ensuring that students benefit from AI tools without compromising academic integrity or critical thinking (Özer, 2024; Eden et al., 2024).

Overall, the findings suggest that AI has substantial potential to enhance TVL education, but its success depends on improved infrastructure, teacher readiness, curriculum integration, and frameworks that promote balanced, ethical, and meaningful use of AI in learning environments.

Limitation of the Study

This study is limited by its relatively small sample size and focus on one TVL institution, which may reduce the generalizability of findings to other regions or vocational settings. The data were also based primarily on self-reported perceptions, which may be influenced by individual bias or varying familiarity with AI tools. Despite these limitations, the study provides timely and meaningful baseline evidence on AI exposure and its perceived effects on academic performance, engagement, and motivation among Senior High School TVL learners.

RECOMMENDATIONS

Based on the findings of the study, it is recommended that TVL schools strengthen their technological infrastructure by improving internet connectivity and ensuring the availability of essential AI tools so learners can access digital resources consistently.

Teachers may benefit from targeted professional development that builds their competence and confidence in integrating AI into lessons, allowing them to design structured, guided activities that maximize both engagement and learning outcomes.

Schools may further strengthen AI integration by linking AI tools directly to specific TVL competencies. For example, Computer System Servicing students may benefit from AI-assisted troubleshooting simulations, while Technical Drafting learners may use AI-supported design tools for improving layout accuracy and visualization. Integrating AI into strand-based performance tasks can enhance both practical skill development and student engagement, ensuring that AI supports (not replaces) hands-on learning.

Establishing clear guidelines on academic integrity, proper attribution, and balanced usage can help prevent overreliance while promoting critical thinking and creativity. Collaboration between administrators, teachers, and students is also encouraged to continuously evaluate and improve AI-supported learning environments.

Overall, strengthening support systems and integrating AI through thoughtful instructional design can enable students to benefit more fully from AI technologies in their TVL education.

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