The Influence of Teachers' Computer Competencies on E-Learning Engagement of College Students

Melven E. Gaviola[1], Emma S. Mirandilla[2], Roteo C. Anoche Jr[3], Helaria B. Carmona[4,] John Mark B. Lazaro[5]

[123]Student, Santo Tomas College of Agriculture Sciences and Technology,

[45]Instructor, Santo Tomas College of Agriculture Sciences and Technology

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ABSTRACT

This study explored how teachers' computer competencies influence the e-learning engagement of college students in Santo Tomas, Davao del Norte. A quantitative descriptive-correlational design was used, involving 359 college students selected through stratified random sampling. Data were collected using adapted survey questionnaires measuring teachers' computer competencies and students' e-learning engagement. Results showed that teachers' computer competencies were high, and students also demonstrated a high level of engagement in online learning, which means oftentimes observed. Statistical analysis revealed a strong and significant relationship between teachers' computer competencies and students' e-learning engagement. These findings suggest that when teachers are more competent in using technology, students become more active, motivated, and engaged in e-learning. The study highlights the importance of strengthening teachers' digital skills to enhance the quality of online learning in higher education.

Keywords: Teachers' computer competencies; E-learning engagement; Online learning; Higher education; College students

INTRODUCTION

E-learning engagement refers to the extent of learners' involvement, interaction, and active participation in online learning experiences (Continu, 2025). Nonetheless, a number of concerns affect the level of engagement in e-learning. According to Akpen et al. (2025), other challenges include those related to educational policy, teaching methods, accessibility, affordability, and flexibility. A considerable number of students face difficulties accessing the internet, which causes participation and attendance issues in virtual classes, thus impeding the full adoption of online learning platforms.

In the present century, technology has become an integral part of the learning process and has significantly expanded e-learning in colleges and universities. Despite this, one problem that still persists is that most of the teachers lack the required computer competencies, which negatively impacts the participation of students in online learning. Computer competencies of the teachers are a set of knowledge, skills, and attitudes that are necessary for planning, implementing, and assessing learning activities through technology (Scherer et al., 2021). If the teachers do not possess these qualifications, the quality of teaching and the degree of students' participation in e-learning could be compromised.

Teachers' Computer Competencies are directly related to e-learning engagement among college students. In the case of the instructors who are highly equipped with using digital tools and online platforms, they would be able to create interactive, accessible, and engaging learning materials that would increase the participation and motivation of the students. Hernandez-Mustieles (2024) states that the more digitally competent teachers are, the more engaged the students are in the process, since they can successfully implement technology in instructional techniques that promote collaboration, feedback, and active learning. On the same note, Adarkwah

(2021) highlighted that a teacher who is technologically proficient can address the obstacles to online learning and achieve the goal of more positive student experiences and prolonged engagement.

Numerous studies have been conducted, and they have found that teachers' technological capabilities impact learners' motivation, engagement, and learning performance in online learning. Nonetheless, research analyzing the direct impact of teachers' computer competencies on college students' e-learning engagement is still lacking. Moreover, e-learning is an important form of instruction in the digital era; however, several teachers lack adequate computer proficiency, which may affect student engagement and the overall success of online learning practices. This study is significant in that it would provide empirical evidence to inform educational institutions and policymakers in establishing programs that promote responsible cognitive, behavioral, social, and technological practices among college students. In addition, the research fulfills the Sustainable Development Goal (SDG) 4: Quality Education by promoting quality education through the enhancement of teacher digital competence, encouraging student engagement in e-learning, and supporting the development of essential digital and financial life skills that prepare learners for the future.

Statement Of the Problem

This research filled this gap by examining the teachers' computer competencies and e-learning engagement in the Municipality of Santo Tomas, Davao del Norte. Specifically, this answered the following objectives:

1. What is the level of teacher computer competencies in terms of:

1.1 knowledge of Basic Computer Application

1.2 use of appropriate office and teaching productivity tools;

1.3 facilities equitable to technology that address learning, social and cultural diversity; and

1.4 applying technology to develop students' higher-order thinking skills and creativity?

2. What is the level of e-learning engagement in terms of?

2.1 behavioral;

2.2 social;

2.3 cognitive; and

2.4 technological?

3. Is there any significant relationship between teacher computer competencies and e-learning engagement?

Hypothesis

The null hypothesis was tested at a 0.05 level of significance, stating that there is no significant relationship between teacher computer competencies and e-learning engagement.

Theoretical Framework

This study was anchored on Social Cognitive Theory (SCT) (1986), which posits that teachers with high computer self-efficacy are more inclined to develop and use technology in classroom practices, thereby determining the effectiveness of incorporating e-learning products and students' involvement in the digital world (Bandura, 1986). Furthermore, Kölemen (2023) found that teachers' self-efficacy strongly influences their readiness to integrate technology in classroom practices. Similarly, Williams et al. (2023) emphasized that improving teachers' self-efficacy in technology use enhances their instructional effectiveness and willingness to adopt new digital tools.

Moreover, Self-Determination Theory (SDT), developed by Deci and Ryan (1985), explains how human motivation is influenced by the fulfillment of three basic psychological needs: autonomy, competence, and relatedness. When these needs are satisfied, individuals tend to show higher motivation, engagement, and well-being. Additionally, He et al. (2025) conducted a study grounded in SDT showing that perceived teacher support positively influences students' satisfaction of the three needs (autonomy, competence, relatedness), which in turn positively affects interaction and e-learning engagement.

Conceptual Framework

The conceptual structure of the study's variables is shown in Figure 1. The independent variable is teacher computer competencies by (Monserate, 2018), with four indicators: Knowledge on Basic Computer Application, Use of Appropriate Office and Teaching Productivity Tools, Facilities Equitable to Technology That Address Learning, Social and Cultural Diversity, and Application of Technology to Foster Students' Higher-Order Thinking Skills and Creativity. The dependent variable is e-learning engagement by (Bilocura et al., 2023), with four indicators: the Behavioral, Social, Cognitive, and Technological.

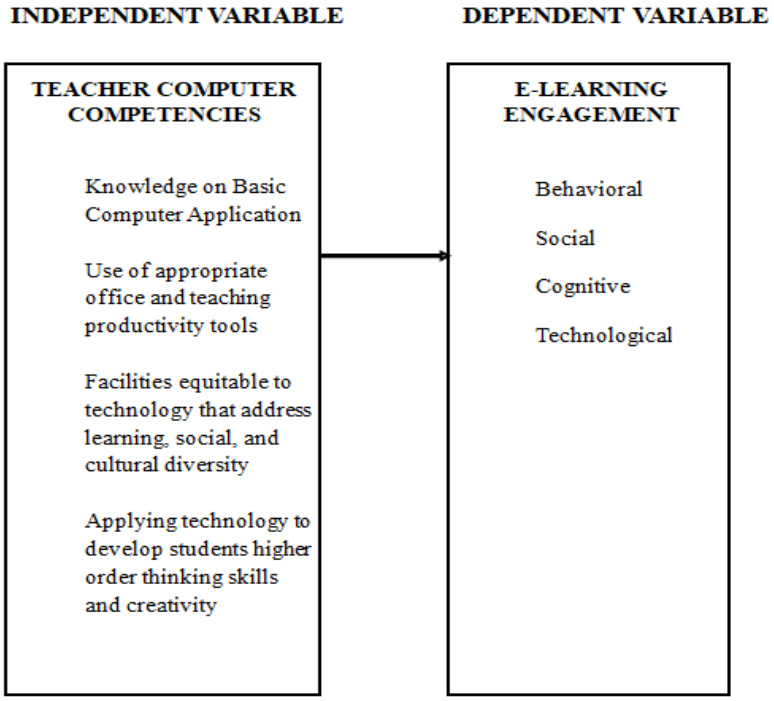

Figure 1. The Conceptual Paradigm of the Study

Significance of the Study

The results of this study would strengthen the effectiveness of other research and provide valuable insights into teachers' computer competencies and e-learning engagement. In particular, the results could be beneficial to:

Commission on Higher Education. This study is useful in providing evidence-based information to help agencies design and implement more effective policies and programs for improving digital teaching in higher education. By understanding how teachers' computer competencies influence students' e-learning engagement, CHED could develop training, allocate resources efficiently, and strengthen its quality assurance standards to ensure that both educators and students would be fully equipped for a technology-driven learning environment.

Teachers. This study is a vital step toward understanding the need to acquire strong computer skills to improve teaching efficiency in online learning. The results could be used by teachers to enhance their digital capabilities, implement new teaching methods, and develop more engaging and interactive e-learning opportunities for learners, ultimately leading to improved learning and professional development.

College Students. This study could help college students lead more engaging, effective, and interactive e-learning experiences. By highlighting the importance of teachers' computer competencies, the study encourages the development of better-designed online lessons and improved use of digital tools, which can enhance students' motivation, participation, and overall learning outcomes in virtual classrooms.

Future Researchers. The research is beneficial as it provides a significant reference and basis for future studies on teachers' computer skills and their participation in online learning. It gives future scholars the possibility to apply, and to broaden or shift to new variables or contexts, or to use novel technologies in the educational digital domain, with empirical insights, theoretical support, and practical implications as the main forms of support in their research.

Definition Of Terms

The following terms will provide both conceptual and operational help to make this study easier to understand.

Teacher Computer Competencies. This terminology refers to the combination of cognitive, technical, and ethical skills that enables teachers to use computers and digital tools for educational innovation, communication, and professional growth (König et al., 2023). In this study, teachers' computer competencies serve as a platform that students and teachers use to teach and learn, and have three indicators: Knowledge on Basic Computer Application, Use of Appropriate Office and Teaching Productivity Tools, Facilities Equitable to Technology that Address Learning, Social, and Cultural Diversity, and Applying Technology to Develop Students' Higher Order Thinking Skills and Creativity.

Knowledge on Basic Computer Application. Technological engagement refers to students' ability to perform digital tasks efficiently, communicate online, and manage electronic resources in an e-learning environment (Mijares, 2022). In this study, individuals have the ability to understand and use essential computer programs such as word processing, spreadsheets, presentations, and internet-based tools for academic or professional tasks.

Use of Appropriate Office and Teaching Productivity Tools. Administrative task management, interactive learning support, and overall teaching efficiency enhancement in both physical and virtual classrooms are the main functions of these technologies (Basilotta et al., 2022). The present study refers to a teacher's competence in a good manner through the use of digital applications to facilitate Microsoft Office, Google Workspace, LMS, and other educational technologies in the occupations of instruction delivery, class management, and student involvement.

Facilities Equitable to Technology that Address Learning, Social, and Cultural Diversity. According to UNESCO (2022), these provisions enable all students to participate in digital and interactive educational experiences to the same extent, regardless of their economic background, cultural affiliation, or learning habits. This study helps to tackle the diversity of learning, social, and cultural environments by pointing out the need for accessible, inclusive, and technology-equipped learning environments that can meet the different needs, backgrounds, and abilities of students.

Applying Technology to Develop Students' Higher Order Thinking Skills and Creativity. Integrating technology into activities where its analysis, evaluation, and creation have been the primary goals would lead students to engage in deeper, more meaningful learning experiences (Howard & Tondeur, 2023) rather than just remembering the content. This study classified the use of digital tools and applications, when strategically planned and implemented to develop higher-order thinking skills and creativity, as a way to engage learners through critical thinking, problem-solving, innovation, and the like.

E-learning Engagement. Engagement in e-learning is reflected through students' participation, effort, and interest in virtual learning tasks (Baloran et al., 2021). In this study, it refers to the behavioral, cognitive, and emotional involvement of learners in online learning environments. It describes how students participate in, think about, and feel toward their e-learning experiences.

Behavioral. Behavioral engagement involves taking part in discussions in class, communicating with the teacher, and finishing the assignments as a sign of one's involvement in digital learning (Nagadeepa et al., 2021). The authors indicate that, in their work, this term describes students' actions and involvement in learning, including attendance in virtual classes, punctual submission of assignments, and participation in discussions and interactions with teachers and other students.

Social. Social engagement refers to students' interaction, collaboration, and connection with others in online learning environments (Nawi et al., 2021). This research highlights how students connect, share, and support each other to enhance their learning experiences.

Cognitive. Cognitive engagement in online learning represents learners' active mental participation, including their willingness to plan, monitor, and reflect on their learning process (Wang & He, 2021). This study focuses on how to measure the level of students' cognitive engagement through indicators such as problem-solving, deep thinking, and strategy use.

Technological. Technological engagement refers to students' familiarity, comfort, and involvement in using digital learning tools such as online platforms, applications, and learning management systems (Dhawan, 2021). In this study, it emphasizes that technological engagement determines students' readiness to adapt to online learning environments and their ability to use digital tools effectively.

METHODOLOGY

This chapter presents the research design together with the research locale, research subject, research instrument, data collection, statistical tools, and ethical considerations to seek useful insights about the relationship between teachers' computer competencies on e-learning engagement of students.

Research Design

This study utilized a quantitative, non-experimental, descriptive-correlational research design to describe the data gathered on the levels of two variables related to teachers' computer competencies and e-learning engagement. Quantitative research adopts a systematic approach to data collection and analysis, emphasizing quantifiable, numerical data (Stanat, 2025). As discussed in the study, specific qualities and important differences generated conclusions in the research. As noted by Ghanad (2023), quantitative research created greater consideration of the problem. Correlational research was a type of non-experimental research in which two or more variables were measured, and the relationship between them was ascertained (Sreekumar, 2025). Stewart (2025) highlighted that this correlational approach allowed researchers to study patterns and relationships as they naturally occurred.

Furthermore, this study used a quantitative, non-experimental, descriptive-correlational design to determine the impact of teachers' computer competencies on e-learning participation among college learners. Survey questionnaires were used to collect data, and correlational methods were used to determine the relationship between the two variables. The rationale for choosing this design was that it measured and described the extent of association between teachers' computer competencies and students' e-learning engagement without manipulating variables or establishing causation.

Research Locale

Figure 2 shows a map of the Davao Region, illustrating Santo Tomas, Davao del Norte, where the study was conducted.

The place is known as a first-class municipality in the Province of Davao del Norte. Administratively, the Municipality of Santo Tomas was subdivided into 19 barangays. According to the recent (2024) Census of Population (POPCEN), it has grown to approximately 131,100 people.

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Santo Tomas is geographically located on the island of Mindanao and is in the province's second political district. It is bounded in the north by the Municipalities of Kapalong and Talaingod, in the east by the Municipality of Asuncion, in the west by Davao City, and in the south by the Municipality of Braulio E. Dujali.

It was named after Saint Thomas, the patron saint of Danao, the hometown of the late governor of undivided Davao Province, Vicente Duterte, father of the 16th Philippine President Rodrigo R. Duterte. Initially called Tibal-og, it was once part of the jurisdiction of the nearby town of Kapalong. Before the 1950s, the area was a lush forest inhabited by the indigenous Ata-Manobo people. It was home to a diverse culture intermingling with Mandaya and Ata-Manobo.

This study was conducted in the Municipality of Santo Tomas, Davao del Norte, where local college instructors and students are the chosen respondents. Aside from the information above, this location is selected as the study locale because Santo Tomas, Davao del Norte, has numerous instructors who are considered knowledgeable and suitable to participate in the research.

Figure 2. Map of the Philippines Highlighting the Municipality of Santo Tomas

Research Subject

The respondents in this study are 359 students from a total population of 5,323 college students at a local college in Santo Tomas, Davao del Norte. The researcher uses Raosoft sampling, an online sample size calculator, to obtain the target sample size from the recorded population. The respondents were selected through a stratified random sampling technique. Hayes (2023) stated that stratified random sampling differs from simple random sampling, which involves the random selection of data from an entire population.

Research Instrument

The researchers used two (2) modified adapted survey questionnaires for the independent dependent variable. The questionnaires were validated by the panelist and an external validator to ensure their validity.

Teachers' Computer Competencies Questionnaire

The questionnaire used to assess the level of Teachers' Computer Competencies is from the research study titled "Impact of Technology on the Academic Performance of Students and Teaching Effectiveness" (Monserate, 2018). The questionnaire consists of 20 items covering the following aspects: Knowledge on Basic Computer

Applications (5 items), Use of appropriate office and teaching productivity tools (5 items), Facilities equitable to technology that addresses learning, social and cultural diversity (5 items), and Applying technology to develop students' higher order thinking skills and creativity (5 items). Respondents rated each item using a 5-point Likert scale, from 5 for "Always Observed", 4 for "Oftentimes Observed", 3 for "Sometimes Observed", 2 for "Seldom Observed", and 1 for "Least Observed".

The parameters used to interpret the teachers' computer competencies and e-learning engagement of college students studying at a local higher education institution in Santo Tomas, Davao del Norte are the following:

Range of Mean	Descriptive Level	Interpretation
4.20 – 5.00	Very high	Teachers' Computer Competencies were always observed.
3.40 – 4.19	High	Teachers' Computer Competencies were oftentimes observed.
2.60 – 3.39	Moderate	Teachers' Computer Competencies were sometimes observed.
1.80 – 2.59	Low	Teachers' Computer Competencies were seldom observed.
1.00 – 1.79	Very low	Teachers' Computer Competencies were least observed.

E-Learning Engagement Questionnaire

The questionnaire used to assess the level of Computer skills is from the research study titled "E-Learning Engagement of Pre-Service Education Students" (Bilocura et al., 2023). The questionnaire consists of 20 items covering the following aspects: Behavioral (5 items), Social (5 items), Cognitive (5 items), and Technological (5 items). Respondents rated each item using a 5-point Likert scale, from 5 for "Always Observed", 4 for "Oftentimes Observed", 3 for "Sometimes Observed", 2 for "Seldom Observed", and 1 for "Least Observed".

The parameters used to interpret the teacher's computer competencies and e-learning engagement of college students studying at a local higher education institution in Santo Tomas, Davao del Norte, are the following:

Range of Mean	Descriptive Level	Interpretation
4.20 – 5.00	Very high	E-Learning Engagement were always observed.
3.40 – 4.19	High	E-Learning Engagement were oftentimes observed.
2.60 – 3.39	Moderate	E-Learning Engagement were sometimes observed.
1.80 – 2.59	Low	E-Learning Engagement were seldom observed.
1.00 – 1.79	Very low	E-Learning Engagement were least observed.

Data Collection

The following procedures were followed by the researchers in order to gather the data:

Seeking authorization to undertake research. Before starting the study, the researchers obtained permission from the Research Director to collect data. Experts reviewed the research questionnaire to ensure its accuracy and reliability. To officially proceed with the study, the researchers obtained an Ethics Clearance Certificate before collecting any data.

Asking permission from the respondents. The respondents were given informed consent forms prior to data collection. The research aimed to protect the privacy and security of the data. It also adhered closely to ethical

standards, ensuring the well-being, fairness, and dignity of all participants. The respondents were informed before any data were collected about the purpose of the study, the role they would play, and how their data would be used.

Questionnaire Distribution and Retrieval. Upon receiving the research approval, the researchers brought the required research equipment to the subjects. In a bid to maintain the validity and reliability of the study, the researchers carefully monitored the dissemination and collection of questionnaires to facilitate full responses.

Collecting and Analyzing Data. The data were tabulated, summarized, and analyzed after the research instruments were collected. The researchers worked with the appropriate statisticians to ensure accurate interpretation of the results.

Statistical Tools

The following statistical tools were used to compute the data and test the hypothesis at the 0.05 level of significance.

Mean. The mean is the total sum of values in a sample divided by the number of values in the sample (Hurley & Tenny, 2023). This tool was useful for determining the relationship between teachers' computer competencies and college students' e-learning engagement.

Pearson r. Pearson's correlation coefficient is a parametric test, which requires normally distributed continuous variables. This test uses a linear modelling relationship to describe how well a relationship describes an interaction between variables (Alsaqr, 2021). This tool was useful for determining the relationship between teachers' computer competencies and college students' e-learning engagement.

Ethical Consideration

Voluntary participation. The participants were volunteers and had the freedom to participate, with sufficient time to complete the questionnaires and share their true views on the research topics. Moreover, they have the option to withdraw from the study if they feel they would gain nothing from it or if it causes them discomfort.

Privacy and confidentiality. The respondents' personal information and responses were strictly protected in order to ensure the respondents' data privacy. Respondents' consent was obtained, and appropriate permission was sought to ensure the security of their provided data, which ensures respondents' safety.

Informed consent process. The research questionnaires were checked and prepared for respondents, ensuring they were free of technical terms and easier to understand. The questionnaires were distributed with the permission of each respondent's parent or guardian.

Recruitment. The distribution of respondents accurately demonstrates how they were distributed. Furthermore, the data collection process and the administration of questionnaires to the respondents in this study were explained.

Risk. The study was deemed to pose no risk of situations that respondents might find inappropriate for their physical, mental, or emotional well-being.

Benefits. The findings of this study benefited the school, educators, and learners by providing new information on the issue, which would improve teachers' interpersonal support, socialization, and ethical climate.

Plagiarism. The study was thoroughly examined and presented to the researcher's adviser numerous times to ensure its authenticity. To avoid plagiarism and ensure that this research study is free of scientific misconduct, the researcher has properly cited and recited the intellectual properties of other researchers. The results were fair, and no changes to the actual results.

Fabrication. This study ensured that there was no fabrication, exaggeration, or alteration of the responses after the survey. This study also ensured that the information included in the manuscript was consistent with the existing literature.

Falsification. This research study was entirely free of fabrication. The data was derived from respondents ' strict adherence to answering survey questions with their own opinions and viewpoints.

RESULTS

This chapter presents an analysis of data collected from college students regarding teachers' computer competencies and e-learning engagement. The problem statement serves as the basis for the data layout.

Level of Teachers' Computer Competencies of College Students

The descriptive statistics for the teachers' computer competencies were presented, examined, and interpreted in Table 1, with an overall mean of 4.08 and a standard deviation (SD) of 0.83, which is considered high. This implies that the teachers' computer competencies among college students are often observed. It also indicates in the result that applying technology to develop students' higher-order thinking skills and creativity possesses the highest mean of 4.15 and an SD of 0.79 with a descriptive level of high, which denotes that applying technology to develop students' higher-order thinking skills and creativity is often observed. This implies that college students often have strong knowledge of digital and computer tools and know how to effectively apply their skills. Additionally, Knowledge on Basic Computer Application has the lowest mean of 3.99 and SD of 0.85, where the level of description is high, indicating that knowledge of basic computer application is oftentimes observed. This result implies that although knowledge of Basic Computer Applications is frequently demonstrated, there is still a need for continuous practice and targeted support to further enhance and sustain students' proficiency in this area.

Table 1 Level of teacher computer competencies

Indicators	**Mean**	**SD**	**Descriptive Equivalent**
1. Knowledge on Basic Computer Application	3.99	0.85	High
2. Use of appropriate office and teaching productivity tools	4.07	0.85	High
3. Facilities equitable to technology that address learning, social; and cultural diversity	4.11	0.81	High
4. Applying technology to develop students higher order thinking skills and creativity	4.15	0.79	High
Overall	**4.08**	**0.83**	**High**

Level of E-Learning Engagement of College Students

The results of e-learning engagement were displayed, analyzed, and explained in Table 2, and revealed that college students had a high level of e-learning engagement, with an overall mean of 4.17 and an SD of 0.80, which is described as high. This implies that e-learning engagement of the college students is oftentimes observed. It also suggests that the result Behavioral possesses the highest Mean of 4.20 and an SD of 0.78 with a descriptive level of very high, which denotes that Behavioral is always observed. This implies that college students are highly engaged in e-learning activities, demonstrating strong participation and involvement in online educational environments. Additionally, Cognitive has the lowest mean of 4.14 and an SD of 0.77, with a high level of description, indicating that Cognitive is often observed. This implies that cognitive aspects are consistently demonstrated and play a significant role in the observed behaviors or performance.

Table 2 Level of e-learning engagement

Indicators	Mean	SD	Descriptive Equivalent
1. Behavioral	4.20	0.78	Very High
2. Social	4.17	0.82	High
3. Cognitive	4.14	0.77	High
4. Technological	4.18	0.82	High
Overall	**4.17**	**0.80**	**High**

Correlation between Teachers' Computer Competencies and E-Learning Engagement of College Students

Displayed in Table 3 is the relationship between the independent variable (Teachers' Computer Competencies) and the dependent variable (E-Learning Engagement). The overall coefficient of correlation is .731, with a value of $p < 0.001$, which is lower than the 0.05 level of significance. This indicates a significant relationship between teachers' computer competencies and e-learning engagement, as the p-value is <0.001. Thus, the null hypothesis of no significant relationship is therefore rejected. The overall correlation coefficient of .731 also showed a positive, high correlation between the two variables.

Table 3. Significance of the relationship between teacher computer competencies and e-learning engagement

Variables Correlated	Mean	r	p-value	Decision on H_o	Decision on Relationship
Teachers' computer competencies	4.08				
E-learning engagement	4.17	0.731**	<0.001	Rejected	Significant

DISCUSSION

This chapter presents the summary, conclusion, and recommendations on the research findings. The result discussed the relationship between teachers' computer competencies and e-learning engagement of college students.

Level of Teachers' Computer Competencies of College Students

The result revealed that college students have a high level of teachers' computer competencies, which means teachers' computer competencies are oftentimes observed. This means that college students frequently demonstrate and experience teachers having strong computer skills. Moreover, teachers regularly show a high level of ability and confidence in using computer technology, which is noticeable and common in the learning environment.

The findings confirm the conclusions of Basilotta-Gómez-Pablos et al. (2022), who found that educators in higher education frequently exhibit strong digital skills across various technological domains. Similarly, Yulin and Danso (2025) highlighted that teachers generally possess advanced digital competence, which supports readiness to integrate technology into pedagogy effectively. Research by Garzón-Artacho et al. (2021) also confirmed that university instructors have well-developed ICT skills essential for lifelong learning contexts. Furthermore, Llego (2024) emphasized the high level of digital competence among long-serving teachers, reinforcing the view that experienced educators often maintain strong computer skills to enhance teaching effectiveness.

Level of E-Learning Engagement of College Students

The result revealed that college students have a high level of e-learning engagement, which means e-learning engagement is often observed. This implies that college students frequently participate actively and consistently in e-learning activities.

This finding aligns with Wang et al. (2023), who emphasized that behavioral engagement is a key predictor of students' participation and success in virtual learning environments. Although cognitive engagement obtained the lowest level among the dimensions, it remained high, indicating that students are still mentally invested and actively processing learning materials. In addition, this result is supported by Chen and Zhang (2024), who found that cognitive engagement plays a crucial role in enhancing students' understanding and critical thinking in e-learning contexts. Overall, the high level of e-learning engagement observed among college students is consistent with the findings of Lee et al. (2022), who reported that strong engagement in online learning environments contributes to improved learning outcomes and higher student satisfaction.

Correlation between Teachers' Computer Competencies and E-

Learning Engagement of College Students

This study examined the relationship between teachers' computer competencies, as the independent variable, and e-learning engagement, as the dependent variable. The findings revealed a strong and significant positive relationship between teachers' computer competencies and e-learning engagement, indicating that higher levels of teachers' computer competencies were associated with higher levels of student engagement in e-learning. The probability value ($p < 0.001$) confirmed that this relationship was statistically significant.

This result was supported by Salimi et al. (2024), who highlighted the direct impact of online teaching competencies on student engagement and emphasized the importance of strong digital skills among faculty to promote innovative teaching practices. Similarly, the findings were consistent with Luo et al. (2025), who reported that high levels of teachers' computer competencies significantly enhanced e-learning engagement among college students by creating more interactive and effective learning environments. Previous studies further indicated that teachers' digital competence improves students' academic self-efficacy and strengthens engagement across behavioral, emotional, and cognitive dimensions.

The observed relationship was also aligned with Social Cognitive Theory (SCT) (Bandura, 1986), which posits that teachers with high computer self-efficacy are more likely to integrate technology effectively into classroom practices, thereby increasing students' involvement in e-learning environments. This theoretical support was reinforced by Kölemen (2023), who found that teachers' self-efficacy strongly influenced their readiness to integrate technology into instructional practices, and by Williams et al. (2023), who emphasized that enhancing teachers' technological self-efficacy improves instructional effectiveness and openness to adopting digital tools.

Furthermore, the findings were consistent with Self-Determination Theory (SDT) by Deci & Ryan (1985), which explains that student engagement increases when the psychological needs of autonomy, competence, and relatedness are satisfied. Supporting this framework, He et al. (2025) demonstrated that perceived teacher support positively influenced students' satisfaction of these needs, resulting in increased interaction and higher levels of e-learning engagement.

CONCLUSION

It was revealed that teachers' computer competencies have a descriptive level of high, which is oftentimes observed. This implies that teachers consistently demonstrate adequate knowledge and skills in using computer technology in the teaching–learning process. Moreover, the study revealed that e-learning engagement has a descriptive level of high, which is oftentimes observed. This shows that students frequently participate and remain actively involved in online learning activities. It also suggests that the e-learning environment effectively supports student interaction, motivation, and sustained engagement.

The results of the study showed a strong and statistically significant positive relationship between teachers' computer competencies and e-learning engagement, as indicated by the probability value of $p < 0.001$. This suggests that higher levels of teachers' computer competencies are closely associated with greater student engagement in e-learning. This finding aligns with the study by Hanaysha (2023), which found that teacher competency and ICT resources positively affected both academic performance and student engagement, reinforcing the idea that more capable teachers with stronger technology skills can foster stronger engagement outcomes. High computer self-efficacy among teachers promotes effective technology use in teaching, resulting in better integration of e-learning tools and enhanced student participation in digital learning settings.

RECOMMENDATION

First, the institution may provide training programs to enhance both students' and teachers' digital competencies. Students would benefit from hands-on workshops focused on essential software applications, such as word processing, spreadsheets, and presentation tools, to improve the quality of their academic work. At the same time, ongoing professional development for teachers would be prioritized to strengthen their digital skills and confidence in using educational technologies. Providing continuous technical support and access to updated digital resources enables educators to create engaging and interactive e-learning environments, ultimately increasing student participation and overall online learning engagement.

Second, the institution may provide strategies to encourage deeper critical thinking and reflection among students in online classes. Moreover, instructors may design activities that promote analysis of experiences and theories, as well as the evaluation and application of knowledge to real-world problems. Incorporating discussion prompts that challenge students to generate new ideas and interpretations can foster higher-order thinking skills. Additionally, providing opportunities for students to connect course concepts with practical situations would enhance their ability to transfer learning beyond the classroom. Regular feedback and guidance may also be provided to motivate students to engage more thoroughly with activities and deepen their understanding.

Third, to strengthen the positive relationship between teachers' computer competencies and students' e-learning engagement, the institution may prioritize ongoing professional development programs that focus on enhancing teachers' digital skills. These programs may provide practical training on the effective use of educational software, online teaching platforms, and interactive digital tools. Additionally, schools may ensure continuous technical support and access to up-to-date technology resources. By investing in teachers' technological proficiency, institutions can create more engaging and effective e-learning environments that encourage greater student participation and improve overall learning outcomes.

Lastly, for future researchers, researchers may explore the impact of emerging technologies, such as artificial intelligence and virtual reality, on both teachers' computer competencies and students' e-learning engagement to gain deeper insights into their evolving roles in education. Further studies could also investigate specific factors that influence cognitive engagement in online learning, as well as effective strategies to enhance it. Additionally, expanding the research to include diverse educational settings and larger sample sizes would help generalize findings and provide a more comprehensive understanding. Employing mixed-methods approaches may also enrich the data by capturing both quantitative trends and qualitative experiences of learners and educators in digital environments.

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