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Teachers' Computer Literacy and Its Influence on Technology Integration in Teaching and Learners' Performance: Evidence from Secondary Schools in Santa Ana, Cagayan, Philippines

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Abstract — The growing integration of information and communication technology (ICT) in education highlights the importance of teachers' computer literacy in enhancing instructional practices and improving learners' academic performance. However, variations in teachers' digital competencies may affect the effectiveness of technology integration in classrooms, particularly in public secondary schools. This study employed a descriptive–correlational research design to examine the relationship between teachers' computer literacy, technology integration in teaching, and learners' performance in three public secondary schools in the Sta. Ana District, Division of Cagayan, Philippines. A total of 121 teachers participated through total enumeration sampling. Data were collected using a validated researcher-made questionnaire assessing teachers' computer literacy (basic computer operations, use of educational software, and internet utilization), the extent of technology integration (instructional delivery, classroom management, and assessment practices), and learners' academic performance based on General Weighted Average (GWA). Findings revealed that teachers exhibited a generally high level of computer literacy (overall mean = 3.32) and a moderately integrated level of technology use in teaching (overall mean = 3.20). Learners' performance was rated very satisfactory, with a mean GWA of 88.65. Significant positive relationships were found between teachers' computer literacy and technology integration ($r = 0.720$, $p = 0.001$), computer literacy and learners' performance ($r = 0.580$, $p = 0.001$), and technology integration and learners' performance ($r = 0.640$, $p = 0.001$). The results indicate that higher levels of teachers' computer literacy contribute to more effective technology integration and improved student performance. Strengthening teachers' digital competencies through targeted professional development is essential to maximize the educational benefits of technology.

Keywords — Computer Literacy, Technology Integration, Academic Performance, Digital Competence, Secondary Education

I. Introduction

The rapid advancement of information and communication technology (ICT) has significantly transformed educational practices worldwide. Technology is now an essential component of effective teaching and learning, requiring teachers to integrate digital platforms, multimedia resources, and online environments into instruction. As a result, classrooms have

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become more dynamic, interactive, and learner-centered, emphasizing the need for teachers to adapt to evolving technological demands.

However, the success of technology integration largely depends on teachers' computer literacy, which refers to their ability to use digital tools efficiently, critically, and pedagogically. Despite the growing emphasis on digital competence, disparities in teachers' computer literacy remain evident, particularly in developing contexts. These disparities raise concerns about instructional quality and learners' academic performance, as not all educators are equally prepared to utilize available technologies.

Differences in teachers' levels of computer literacy affect their ability to implement technology effectively in the classroom. While some educators demonstrate strong ICT proficiency, others struggle with basic digital skills, leading to inconsistent teaching practices and varied learner outcomes. Even when technological resources are available, limited teacher competence often results in underutilization or ineffective application of these tools.

Previous studies emphasize the importance of teachers' digital competence in successful technology integration. Demissie et al. (2022) found that teachers with higher digital competence are more likely to integrate technology effectively, with access to resources and training playing a significant role. Similarly, Cabero-Almenara et al. (2023) reported that digital competence predicts academic success, highlighting its indirect impact on learners' performance through improved instructional quality.

Despite these findings, research gaps remain. Many studies focus on general ICT competence without examining the combined effects of teachers' computer literacy, technology integration, and learners' performance, particularly in localized contexts. Thus, this study aims to examine the influence of teachers' computer literacy on technology integration and learners' performance in the Sta. Ana District, Division of Cagayan, Philippines.

Literature Review

Existing literature highlights that teachers' computer literacy encompasses both technical and pedagogical competencies. Sari and Yuliana (2022) found a significant relationship between ICT literacy and pedagogical competence, indicating that teachers' digital skills enhance their teaching effectiveness. Similarly, Alejo (2025) reported that improved technological literacy contributes to teachers' professional performance.

Furthermore, studies emphasize the role of digital competence in fostering effective learning environments. Kerimbayev et al. (2023) and Zou et al. (2025) noted that student-centered and technology-supported learning environments rely heavily on teachers' ability to integrate digital tools strategically. These findings suggest that teachers' competence is a key factor in maximizing the benefits of ICT in education.

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In terms of learner outcomes, Ma et al. (2024) demonstrated that the use of digital tools can improve academic achievement and higher-order thinking skills when aligned with appropriate pedagogy. Meanwhile, Sibug et al. (2025) highlighted that although teachers generally show positive attitudes toward emerging technologies such as artificial intelligence, continuous training and institutional support are necessary for effective implementation.

Overall, the literature indicates that teachers' computer literacy plays a crucial role in technology integration and learners' academic performance. However, there is still a need for context-specific studies to better understand how these factors interact in different educational settings.

Research Questions

This study aimed to investigate the influence of teachers' computer literacy on technology integration in teaching and learners' performance in the Sta. Ana District, Division of Cagayan, Philippines. Specifically, it sought to answer the following research questions:

1. What is the level of teachers' computer literacy in terms of the following?
    a. basic computer operations
    b. use of educational software and applications
    c. internet and digital resource utilization
2. What is the extent of teachers' technology integration in teaching in terms of the following?
    a. instructional delivery
    b. classroom management
    c. assessment, and evaluation practices
3. What is the learner's performance based on their general weighted average (GWA)?
4. Is there a significant relationship between the overall teachers' computer literacy, technology integration in teaching, and learners' performance?

II. Methodology

Research Design

This study employed a descriptive–correlational research design to examine the relationship between teachers' computer literacy, technology integration in teaching, and learners' performance. The descriptive component was used to determine the levels of teachers' computer

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literacy, technology integration in instructional practices, and learners' academic performance without manipulating variables, providing an accurate picture of real classroom conditions. Meanwhile, the correlational approach examined the significant relationships among the variables, identifying the strength and direction of associations between teachers' digital competence, their use of technology in teaching, and learners' performance, thereby offering insights into how teachers' computer literacy may influence instructional practices and student outcomes.

Participants of the Study

The respondents of this study were all teachers from three selected public secondary schools in the Sta. Ana District, Division of Cagayan, Philippines. A total enumeration sampling technique was employed to include all teachers, ensuring comprehensive data collection and reducing sampling bias. This approach allowed the study to capture variations in teachers' computer literacy and technology integration practices across different school contexts, enhancing the accuracy and reliability of the findings. The distribution of respondents is presented in the table below.

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Schools	**Number of Teachers**
School A	80
School B	32
School C	9
Total	**121**

Instrumentation

This study utilized a researcher-made questionnaire as the primary data-gathering instrument to determine the influence of teachers' computer literacy on technology integration in teaching and learners' performance. The questionnaire was developed based on the study's objectives and research questions to ensure the collection of relevant and reliable data from teacher-respondents concerning their computer literacy, technology integration practices, and learners' academic performance.

The instrument consisted of three parts: the first measured learners' performance using the General Weighted Average (GWA) based on official school records; the second assessed teachers' computer literacy in terms of basic computer operations, use of educational software and applications, and internet and digital resource utilization using a Likert scale; and the third determined the extent of technology integration in instructional delivery, classroom management, and assessment practices. Prior to data collection, the questionnaire was validated by experts in education and educational technology to ensure content validity, clarity, and relevance, with necessary revisions incorporated to strengthen the instrument.

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Analysis of Data

The collected data were analyzed using both descriptive and inferential statistics to address the research questions of the study. Weighted means were used to determine the levels of teachers' computer literacy, the extent of technology integration in teaching, and learners' academic performance based on their General Weighted Average (GWA). Pearson Product–Moment Correlation Coefficient (r) was employed to examine the significant relationships among teachers' computer literacy, technology integration in teaching, and learners' performance, with all analyses conducted at a 0.05 level of significance to determine the strength and direction of these relationships and serve as the basis for conclusions and recommendations.

III. Results and Discussion

Level of teachers' computer literacy

The results indicate that teachers demonstrate a generally high level of computer literacy, with an overall mean of 3.32 interpreted as "Highly Literate". Among the three dimensions, Basic Computer Operations obtained the highest mean (mean = 3.38), suggesting that teachers are proficient in fundamental digital skills such as operating computers, using word processing and presentation tools, and managing files. However, a slightly lower rating in troubleshooting (mean = 3.10) reveals that while teachers are comfortable with routine tasks, they may still encounter challenges when dealing with technical issues. This suggests a need for targeted support in problem-solving and technical maintenance skills.

In terms of the Use of Educational Software and Applications, the mean score of 3.23 indicates a "Moderately Literate" level. While teachers show strong capability in using educational applications and integrating multimedia tools, they are relatively less confident in utilizing learning management systems, selecting appropriate software, and designing interactive digital activities. This implies that although teachers possess foundational knowledge of digital tools, their ability to maximize these tools for pedagogical purposes is still developing. The findings highlight the importance of continuous professional development focused on pedagogical integration of technology rather than mere technical use.

The dimension on Internet and Digital Resource Utilization yielded a mean of 3.34, interpreted as "Highly Literate." Teachers exhibit strong skills in searching for teaching materials, evaluating online resources, and sharing digital content. However, slightly lower scores in online communication and collaboration (mean = 3.20) suggest that teachers may not be fully utilizing digital platforms to engage students interactively. This indicates that while teachers can access and use online resources, there is still room for improvement in leveraging these platforms to foster collaboration and active learning among students.

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Overall, the findings imply that teachers are generally well-equipped with essential computer literacy skills, which is a positive indicator for technological integration in teaching. However, gaps remain in more advanced and pedagogical aspects of technology use, particularly in troubleshooting, interactive tool utilization, and digital collaboration. These results suggest that training programs should move beyond basic ICT skills and focus on enhancing teachers' confidence and competence in applying technology in more meaningful and innovative ways. In conclusion, while teachers are highly literate in general, strengthening their applied and pedagogical digital skills is crucial to fully maximize the benefits of technology in improving teaching effectiveness and learners' outcomes.

Statements	Mean	Interpretation
Basic Computer Operations		
1. I can independently operate a computer and manage basic functions (e.g., turning on/off, file management).	3.45	Highly Literate
2. I can use word processing software (e.g., MS Word) for preparing instructional materials.	3.52	Highly Literate
3. I can create and edit presentations using presentation software (e.g., PowerPoint).	3.48	Highly Literate
4. I am confident in troubleshooting minor computer issues during classroom use.	3.10	Moderately Literate
5. I can organize and store digital files efficiently for teaching purposes.	3.36	Highly Literate
Mean	**3.38**	**Highly Literate**
Use of Educational Software and Applications		
6. I can use educational applications to enhance my teaching strategies.	3.30	Highly Literate
7. I can integrate multimedia tools (videos, animations, simulations) into my lessons.	3.28	Highly Literate
8. I can utilize learning management systems (e.g., Google Classroom) for instruction.	3.15	Moderately Literate
9. I can select appropriate educational software that aligns with my lesson objectives.	3.22	Moderately Literate
10. I am confident in using digital tools to create interactive learning activities.	3.18	Moderately Literate
Mean	**3.23**	**Moderately Literate**
Internet and Digital Resource Utilization		
11. I can effectively search for relevant teaching materials using the internet.	3.50	Highly Literate
12. I can evaluate the credibility of online resources before using them in class.	3.32	Highly Literate
13. I use online platforms to communicate and collaborate with students.	3.20	Moderately Literate
14. I can download, upload, and share digital learning materials efficiently.	3.40	Highly Literate
15. I integrate online resources (e.g., websites, videos, articles) into my teaching.	3.27	Highly Literate
Mean	**3.34**	**Highly Literate**
Overall Mean	**3.32**	**Highly Literate**

Range	Interpretation
1.00 – 1.74	Not Literate
1.75 – 2.49	Slightly Literate

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2.50 – 3.24	Moderately Literate
3.25 – 4.00	Highly Literate

Extent of teachers' technology integration in teaching

The results reveal that the overall extent of technology integration in teaching is "Moderately Integrated" with an overall mean of 3.20. Among the three dimensions, Instructional Delivery obtained the highest mean (mean = 3.32), interpreted as "Highly Integrated". This indicates that teachers are effectively utilizing technology in delivering lessons, particularly through digital presentations, multimedia resources, and interactive tools. The high ratings suggest that teachers recognize the value of technology in enhancing students' understanding and making lessons more engaging. However, the slightly lower mean in using technology for differentiated instruction (mean = 3.20) implies that teachers may still need support in tailoring digital tools to meet diverse learner needs.

In contrast, Classroom Management recorded the lowest mean (mean = 3.04), interpreted as "Moderately Integrated". This suggests that while teachers use technology to some extent for monitoring participation, organizing activities, and maintaining discipline, its application in classroom management is not as strong or consistent as in instructional delivery. The relatively lower scores, particularly in managing student behavior using technology (mean = 2.88), indicate that teachers may be less familiar with or less confident in using digital tools for managing classroom dynamics. This highlights a potential area for professional development, focusing on integrating technology not only in teaching content but also in managing the learning environment effectively.

For Assessment and Evaluation Practices, the mean of 3.25 indicates a "Highly Integrated" level. Teachers demonstrate strong use of technology in administering assessments, providing feedback, and tracking students' performance. These findings suggest that digital tools are being effectively utilized to support assessment processes and improve monitoring of student progress. However, moderate ratings in designing higher-order thinking assessments (mean = 3.10) and analyzing results (mean = 3.22) imply that teachers may still be developing skills in using technology for more advanced and analytical assessment practices. This suggests the need for further training in creating meaningful, technology-based assessments that go beyond basic evaluation.

Overall, the findings imply that teachers are more confident and consistent in integrating technology into instructional delivery and assessment than in classroom management. While technology integration is evident across all areas, it is not yet fully maximized. These results underscore the importance of enhancing teachers' competencies in using technology holistically across all teaching dimensions. In conclusion, although teachers demonstrate a moderate level of overall technology integration, strengthening their skills in classroom management and advanced

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assessment practices can further improve the effectiveness of technology use in teaching and ultimately enhance learners' performance.

Statements	Mean	Interpretation
Instructional Delivery		
1. I use digital presentations to deliver lesson content effectively.	3.42	Highly Integrated
2. I incorporate multimedia resources to enhance student understanding.	3.38	Highly Integrated
3. I use technology to support differentiated instruction.	3.20	Moderately Integrated
4. I integrate interactive tools (e.g., quizzes, apps) during lesson delivery.	3.25	Highly Integrated
5. I use technology to explain complex concepts more clearly.	3.35	Highly Integrated
Mean	**3.32**	**Highly Integrated**
Classroom Management		
6. I use digital tools to monitor student participation and engagement.	3.18	Moderately Integrated
7. I implement classroom management systems supported by technology.	3.05	Moderately Integrated
8. I use technology to organize class activities and schedules.	3.12	Moderately Integrated
9. I utilize digital platforms to maintain classroom discipline and order.	2.95	Moderately Integrated
10. I manage student behavior using technology-based strategies.	2.88	Moderately Integrated
Mean	**3.04**	**Moderately Integrated**
Assessment and Evaluation Practices		
11. I use online tools to create and administer assessments.	3.30	Highly Integrated
12. I provide feedback to students using digital platforms.	3.28	Highly Integrated
13. I use technology to track and record students' performance.	3.34	Highly Integrated
14. I design digital assessments that measure higher-order thinking skills.	3.10	Moderately Integrated
15. I analyze students' results using digital tools to improve instruction.	3.22	Moderately Integrated
Mean	**3.25**	**Highly Integrated**
Overall Mean	**3.20**	**Moderately Integrated**

Range	**Interpretation**
1.00 – 1.74	Not Integrated
1.75 – 2.49	Slightly Integrated
2.50 – 3.24	Moderately Integrated
3.25 – 4.00	Highly Integrated

Learners' Performance based on Class General Weighted Average (GWA)

The findings show that most learners fall under the Very Satisfactory (85–89) category, with a frequency of 72 or 60.33 percent, while 48 or 39.67 percent of the learners are classified as Outstanding (90 and above). The computed mean of 88.65 indicates that, on average, learners are performing at a very satisfactory level, approaching the outstanding category. Additionally, the standard deviation of 2.45 suggests that the learners' performance is relatively consistent, with only slight variations among their grades. This implies that most students are achieving similar levels of academic success, reflecting a stable performance across the group.

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These findings imply that learners are generally performing well academically, which may be attributed to effective instructional practices and the integration of technology in teaching. However, since a larger proportion of learners remain in the very satisfactory category rather than outstanding, there is still potential for improvement in elevating student performance to higher levels. This suggests that enhancing teaching strategies, particularly through more effective and innovative use of technology, could help increase the number of learners achieving outstanding performance.

Learners' Performance	**Frequency (n=121)**	**Percentage**
Outstanding (90 and above)	48	39.67
Very Satisfactory (85 to 89)	72	60.33
Mean = 88.65	**S.D. = 2.45**	

Relationship between teachers' computer literacy, technology integration in teaching, and learners' performance

The correlation analysis reveals significant relationships among teachers' computer literacy, technology integration in teaching, and learners' performance. Specifically, teachers' computer literacy has a strong positive relationship with technology integration in teaching ($r = 0.720$, $p = 0.001$), indicating that higher levels of computer literacy are associated with greater use of technology in instructional practices. Additionally, teachers' computer literacy shows a moderate positive relationship with learners' performance ($r = 0.580$, $p = 0.001$), suggesting that teachers who are more digitally competent tend to have students with better academic outcomes. Furthermore, technology integration in teaching is moderately to strongly correlated with learners' performance ($r = 0.640$, $p = 0.001$), indicating that effective use of technology in the classroom contributes to improved student achievement. All relationships were found to be statistically significant at the 0.005 level, confirming that these associations are not due to chance.

These findings have important implications for educational practice and policy. The strong relationship between teachers' computer literacy and technology integration highlights the need to continuously enhance teachers' digital competencies through targeted training and professional development programs. Since teachers who are more computer literate are more likely to integrate technology effectively, investing in their digital skills can lead to improved teaching practices. Moreover, the positive relationship between technology integration and learners' performance suggests that the use of technology can enhance student engagement, understanding, and achievement. Therefore, schools should not only provide access to technological resources but also ensure that teachers are equipped with the necessary skills to utilize these tools meaningfully. This underscores the importance of holistic support systems, including infrastructure, training, and administrative encouragement.

The results of this study are supported by several recent studies in the field. Peng et al. (2024) and Demissie et al. (2022) cited that teachers' ICT competence significantly influences

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their ability to integrate technology effectively into their teaching practices. Similarly, Montilla et al. (2023) reported that teachers with higher levels of digital competence tend to foster better academic performance among students due to more engaging and interactive instructional approaches. Additionally, Ma et al. (2024) highlighted that technology integration positively impacts students' learning outcomes, particularly when teachers are proficient in using digital tools. Another study by Cabero-Almenara et al. (2023) emphasized that both technological skills and pedagogical knowledge are essential for maximizing the benefits of ICT in education. These studies collectively reinforce the findings of the present research, confirming that teachers' computer literacy plays a crucial role in effective technology integration and improved learner performance.

In conclusion, the study establishes that teachers' computer literacy is a significant factor influencing both technology integration in teaching and learners' academic performance. The correlations among the variables indicate that improving teachers' digital skills can lead to more effective instructional practices and better student outcomes. These findings highlight the need for continuous professional development, adequate technological resources, and supportive educational policies to enhance teachers' competence in using technology. Ultimately, strengthening teachers' computer literacy and promoting effective technology integration can contribute to a more dynamic, engaging, and effective learning environment, thereby improving overall educational quality.

Variable	Coefficient (r)	Probability	Statistical Inference
Teachers' Computer Literacy * Technology Integration in Teaching	0.720	0.001	Significant
Teachers' Computer Literacy * Learners' Performance	0.580	0.001	Significant
* Technology Integration in Teaching * Learners' Performance	0.640	0.001	Significant

*Tested using Pearson Correlation at 0.005 level of significance

IV. Conclusion

This study concludes that teachers generally demonstrate a high level of computer literacy, particularly in basic computer operations and internet resource utilization, although some areas, such as the use of educational software and troubleshooting skills, require further improvement. The extent of technology integration in teaching was found to be moderate overall, with stronger application in instructional delivery and assessment practices than in classroom management. Meanwhile, learners' performance was generally very satisfactory, indicating that students are achieving commendable academic outcomes. These findings suggest that while teachers possess the foundational skills necessary for technology use, there is still a need to enhance their ability to fully integrate digital tools across all aspects of teaching.

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Furthermore, the study established significant relationships among teachers' computer literacy, technology integration, and learners' performance. The results confirm that higher levels of computer literacy among teachers lead to more effective integration of technology, which in turn contributes to improved student performance. This highlights the critical role of teachers' digital competence in achieving better educational outcomes. Therefore, educational institutions need to strengthen professional development programs, provide adequate technological resources, and support teachers in developing both technical and pedagogical skills. Enhancing these areas will enable teachers to maximize the potential of technology in teaching, ultimately leading to improved learner achievement and a more effective educational system.

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