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AI Applications and Academic Efficiency: A Study of Second-Year BSICT Students

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Abstract: *This study examined the effect of artificial intelligence (AI) applications on the efficiency of second-year students enrolled in the Bachelor of Science in Information and Communications Technology (BSICT) program. As AI tools were becoming increasingly integrated into educational settings, their impact on student productivity, learning retention, and engagement warranted investigation. The research employed a quantitative descriptive-correlational design, using a structured survey to gather data from 92 students. The study focused on three key areas: code completion, code debugging, and task automation. Results showed that students perceived AI tools as significantly helpful in enhancing coding speed, reducing manual workload, and improving overall academic performance. However, findings also indicated a potential risk of over-reliance on these tools, which could affect the development of critical thinking and problem-solving skills. The study concluded that AI applications can serve as valuable educational aids when integrated thoughtfully, supporting both learning efficiency and skill development. Recommendations included guided usage strategies for students and educators to ensure balanced learning.*

Keywords: Artificial Intelligence, Coding Education, Learning Retention, Programming Tools.

I. INTRODUCTION

Artificial intelligence (AI) applications have increasingly transformed the landscape of higher education, particularly in technology-related programs. AI tools such as ChatGPT and intelligent code editors are being integrated into student workflows to assist with programming, debugging, research, and problem-solving. Their impact on student learning outcomes has been widely acknowledged, yet specific effects on student efficiency remain insufficiently studied. Existing studies suggest that AI-enhanced learning environments can improve academic performance by providing instant feedback and promoting self-paced learning [1], [2]. For example, AI-powered systems are known to reduce repetitive workload and support personalized learning approaches [3]. However, scholars have raised concerns about students' potential over-reliance on such tools, which could negatively affect their problem-solving skills and academic independence if not managed properly [4]. While many studies highlight the advantages of AI in general academic contexts, there is limited research on its effect on efficiency among students in information and communication technology (ICT) programs. Efficiency, in this study, refers to students' ability to manage time, complete academic tasks, and maintain productivity using AI tools. Understanding this relationship is critical for shaping how these technologies are incorporated into educational strategies. To address this, the study sets the following objectives: (1) Assess the effect of AI applications on the efficiency of second-year BSICT students, (2) Analyse how AI tools impact students' productivity, time management, and academic performance, (3) Determine the extent to which students rely on AI applications for their academic tasks, (4) Identify the benefits and challenges of AI-assisted learning among BSICT students, and (5) Provide recommendations on the proper integration of AI tools to improve student efficiency while maintaining critical thinking and problem-solving skills.

In Fig. 1 showed the framework that examined the impact of various AI applications on the efficiency of second-year BSICT (Bachelor of Science in Information and Communications Technology) students. It analysed the relationship

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between independent variables (AI applications) and dependent variables (student efficiency metrics) to understand how AI tools affected student performance and learning outcomes.

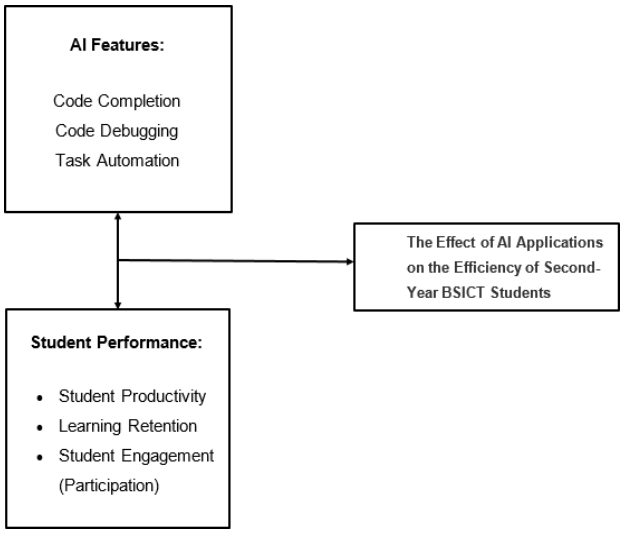

Fig. 1 A conceptual framework of the study

Moreover, this study was based on educational technology theory, which contended that AI and similar tools could improve student learning by providing individualized, interactive, and feedback-rich environments [24]. This theoretical foundation lent credence to the idea that effectively incorporating AI into academic work could boost productivity, motivation, and retention—but if done poorly, it could also run the risk of fostering over-reliance. As a result, the study also subtly considered the self-regulated learning hypothesis, which holds that students must actively supervise and manage their use of external resources. This research investigated the influence of AI applications on second-year students enrolled in the Bachelor of Science in Information and Communication Technology (BSICT) program. It aimed to measure the impact of AI tools on productivity, time management, and academic performance using quantitative methods. The study also sought to identify the challenges of AI-assisted learning and propose strategies for effective integration without compromising critical thinking. By focusing on a specific cohort and using structured survey instruments, this study added new insights into the practical benefits and limitations of AI integration in ICT education. The findings were intended to inform educators and institutions about best practices for incorporating AI while fostering independent, reflective learning.

II. RESEARCH METHOD

This quantitative study investigated the impact of AI applications (code completion, debugging, and task automation) on the academic efficiency (productivity, time management, and learning performance) of 92 second-year BSICT students at Surigao del Norte State University. Analysis of a validated Likert scale-based Google Forms questionnaire revealed generally high agreement among respondents that AI tools enhanced coding efficiency and reduced errors; however, concerns regarding over-reliance and the potential diminishment of critical thinking skills were also noted. The study concluded that while AI significantly boosted efficiency, balanced integration is crucial for preserving core programming skills. Recommendations included structured AI classroom use, educator-guided adoption strategies, and further research into the long-term academic impacts of AI tool integration.

TABLE I PARAMETER OF LIMITS

Rating Scale	Mean Scale	Verbal Description	Verbal Interpretation
1	1.00-1.74	Strongly Disagree	Very low Degree
2	1.75-2.49	Disagree	Low Degree
3	2.5-3.24	Agree	High Degree
4	3.25-4.00	Strongly Agree	Very High Degree

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III. RESULTS AND DISCUSSION

Fig. 2 showed the respondent pool that was consisted of 55.5% male and 44.5% female participants. This indicated a slight male majority.

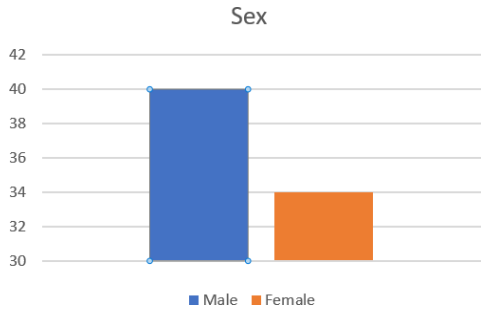

Fig. 2 A gender distribution of respondents

In Fig. 3 showed that the majority of respondents 58.3% were from BSICT 2B, with the remaining 41% from BSICT 2A.

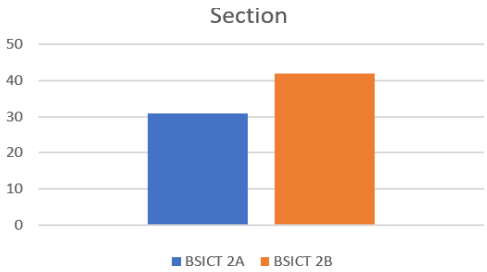

Fig. 3 A respondent section distribution

A. Effects of AI Applications on ICT Students' Programming Efficiency

The effects of AI Applications on ICT students on various aspects of programming efficiency, based on the survey responses were presented in Tables 1-3, showing mean scores, standard deviations, and verbal interpretations. Table 2 presented the results of a survey assessing the perceived impact of AI-assisted code completion tools on student performance. The survey used a Likert scale, with responses ranging from "Strongly Disagree" to "Strongly Agree," and the data was summarized by calculating the mean score for each statement. The mean scores were then categorized into verbal interpretations ("Agree," "Strongly Agree," etc.) and quantitative descriptions ("High Degree," "Very High Degree").

The results showed a generally positive perception of AI-assisted code completion tools among respondents. Across all nine statements related to code completion, the average mean score was 3.22, falling within the "Agree" category and representing a "High Degree" of agreement. This suggested a significant majority of students found these tools beneficial.

Specifically, the strongest agreement was observed for statements related to improved efficiency (Q4: solving problems more efficiently, Q5: automatic code generation, and Q3: more structured code). These high scores indicated that students perceived AI tools as significantly helpful in streamlining their coding process and producing higher-quality code.

TABLE 2: Results on efficiency in terms of code completion

Statements	Mean	Verbal Interpretation	Quantitative Description
Code Completion			
Using AI-assisted coding tools in practice writing programming, It helps me…			
Q1. write code faster.	3.23	Agree	High Degree
Q2. improve my success rate in solving programming	3.14	Agree	High Degree

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problems.			
Q3. write code in a more structured and organized manner.	3.27	Strongly Agree	Very High Degree
Q4. solve coding problems more efficiently through AI-generated suggestions.	3.35	Strongly Agree	Very High Degree
Q5. automatically generate code snippets that align with my intended logic and functionality.	3.26	Strongly Agree	Very High Degree
Q6. participate more frequently in coding challenges.	3.16	Agree	High Degree
Q7. recall coding concepts more effectively in assessments	3.19	Agree	High Degree
Q8. improve my performance in post-learning quizzes	3.23	Agree	High Degree
Q9. automatically complete code based on context and patterns.	3.16	Agree	High Degree
Average:	**3.22**	**Agree**	**High Degree**

While slightly lower, the agreement on statements concerning improved success rates (Q2), faster coding (Q1), and better performance in assessments (Q7 and Q8) still fell within the "Agree" category, further supporting the overall positive perception of AI's impact on coding skills. The more moderate agreement on increased participation in coding challenges (Q6) suggested that while AI might have improved skills, its effect on engagement in competitive coding activities might have been less pronounced.

Table 3 summarizes survey results regarding the perceived effectiveness of AI-assisted tools for code debugging among BSICT students. The data, based on a Likert scale, reveals a generally positive perception, with an average mean score of 3.16 across all nine statements. This average falls within the "Agree" category, indicating a high degree of agreement that AI debugging tools are beneficial.

TABLE 3: The results in terms of code debugging

Statements	Mean	Verbal Interpretation	Quantitative Description
Code Debugging			
Whenever I Use AI-assisted coding tools during debugging, It helps me…			
Q1. fix errors more efficiently.	3.3	Agree	High Degree
Q2. apply correct coding logic as a solution in a given programming problem.	3.19	Agree	High Degree
Q3. minimize errors while identifying and correcting code issues.	3.12	Agree	High Degree
Q4. be more active in coding exercises.	3.12	Agree	High Degree
Q5. engage in coding practice outside of class.	3.09	Agree	High Degree
Q6. to take on more debugging challenges.	3.07	Agree	High Degree
Q7. remember common coding errors.	3.22	Agree	High Degree
Q8. recognize common syntax errors.	3.15	Agree	High Degree
Q9. recall information about different debugging techniques..	3.19	Agree	High Degree
Average:	3.16	Agree	High Degree

The findings suggested that students found AI tools helpful in several key aspects of debugging. While no single statement showed overwhelmingly strong agreement, the consistent "Agree" responses across all statements indicated a widespread positive perception. Students reported that AI tools helped them fix errors more efficiently (Q1), apply correct coding logic (Q2), and minimize errors during the debugging process (Q3). These results strongly suggested that the AI tools assisted students in improving the accuracy and efficiency of their debugging efforts.

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Interestingly, the responses to questions related to engagement (Q4, Q5, Q6) also showed agreement, suggesting that the use of AI tools may have positively influenced students' proactive engagement with coding exercises and practice outside of class. This increased engagement could be attributed to the increased efficiency and reduced frustration associated with using AI-assisted debugging.

The relatively consistent scores across statements related to knowledge retention (Q7, Q8, Q9) further supported the idea that AI tools may not only have improved immediate debugging performance but also contributed to a better understanding of common errors and debugging techniques. The consistent "Agree" responses suggested that these tools facilitated learning and knowledge retention.

The survey results indicated a significant positive perception of AI-assisted debugging tools among the surveyed students. These tools appeared to improve debugging efficiency, promote engagement with coding practices, and potentially facilitate knowledge retention. However, further research could explore the potential long-term impacts on students' problem-solving abilities and independent debugging skills.

TABLE 4: The results in terms of task automation

Statements	Mean	Verbal Interpretation	Quantitative Description
Task Automation			
Whenever I use AI for task automation tools while practicing programming, It helps me...			
Q1. complete repetitive coding tasks more efficiently.	3.2	Agree	High Degree
Q2. reduce the time I spend on manual coding processes.	3.24	Agree	High Degree
Q3. reduce my workload, allowing me to take on more learning opportunities.	3.24	Agree	High Degree
Q4. remember repetitive coding tasks.	3.09	Agree	High Degree
Q5. learn best practices in coding by automating repetitive tasks.	3.14	Agree	High Degree
Q6. recall solutions to common coding problems more easily.	3.22	Agree	High Degree
Q7. be more confident to experiment with different programming techniques.	3.09	Agree	High Degree
Q8. stay motivated to complete programming exercises.	3.18	Agree	High Degree
Q9. increase my interest in exploring advanced programming concepts.	3.18	Agree	High Degree
Average:	**3.18**	**Agree**	**High Degree**

Table 4 presented the results of a survey assessing students' perceptions of AI-powered task automation tools in programming. The data, analyzed using a Likert scale, showed a generally positive response, with an average mean score of 3.18 across all nine statements. This average fell within the "Agree" category, indicating a high degree of agreement that AI task automation tools were beneficial.

The findings consistently indicated that students perceived these tools as enhancing efficiency. Statements related to completing repetitive tasks more efficiently (Q1), reducing time spent on manual coding (Q2), and reducing overall workload (Q3) all received mean scores within the "Agree" range. This suggested that the AI tools successfully alleviated the burden of repetitive tasks, freeing up students' time and cognitive resources.

Interestingly, the positive perception extended to the impact on learning and motivation. While not as strongly endorsed as the efficiency-related statements, the responses to questions regarding learning best practices (Q5), recalling solutions (Q6), increased confidence in experimentation (Q7), and maintained motivation (Q8) all fell within the "Agree" range. This suggested that the use of AI tools did not simply improve efficiency but also potentially fostered a more positive and productive learning environment. The increased confidence in exploring advanced concepts (Q9) further supported this interpretation.

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The survey results indicated that AI-powered task automation tools were viewed favorably by students, primarily due to their perceived efficiency-enhancing capabilities. However, the data also suggested a positive correlation between the use of these tools and increased student engagement, confidence, and motivation in their programming studies. Further research could explore the long-term effects of such tools on the development of problem-solving skills and independent learning.

The findings consistently demonstrated a high degree of satisfaction among ICT students regarding the use of AI tools in their programming tasks. The strong agreement across all three tables suggested that AI-powered tools were not only useful but also significantly improved various aspects of the programming process, from problem-solving and code generation to error reduction and task automation. The slightly lower ratings for certain aspects (e.g., taking on challenges, practicing more) might have suggested that while AI tools were beneficial, they should not replace the need for independent problem-solving and practice. Further research could explore the long-term impact of AI tools on students' problem-solving skills and independent learning abilities. Future studies could also investigate the potential for AI tools to personalize learning experiences and adapt to individual student needs.

IV. CONCLUSION

Based on the analysis and interpretation of the gathered data, it was concluded that AI tools significantly enhance efficiency in coding-related tasks among second-year BSICT students. The high mean scores across all categories suggest that students find AI assistance helpful in improving code quality, reducing errors, and saving time. AI applications positively impact students' productivity and time management, as reflected in improved assessment performance, reduced manual effort, and increased motivation. This supports constructivist theory [25], where tools like AI assist learners in actively building knowledge by easing lower-level tasks. Students demonstrate moderate to high reliance on AI tools for repetitive or logic-based tasks, yet maintain independent effort. This suggests AI functions as a supplementary aid, consistent with constructivism's view of learning as an active, self-driven process [25]. The main benefits of AI- assisted learning include increased accuracy, faster performance, better recall of concepts, and greater engagement. Challenges include potential over-dependence, reduced critical thinking, and limited experimentation. The use of validated tools and strong internal reliability in the instrument ensures that the findings are both relevant and actionable for educators and institutions.

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