Assessing the Relationship Between Campus Wi-Fi Reliability and Student Academic Success

Dr. Jessica Rose E. Fernandez[1], Ianzel A. Morales[2], Larra Vel E. Edradan[3]

Faculty, College of Engineering and Information Technology, Surigao City, Philippines [1]
BSIT Students, College of Engineering and Information Technology, Surigao City, Philippines[2,3]
BSIT Student, College of Engineering and Information Technology, Surigao City, Philippines[3]

Abstract: *The research titled "The Effects of Campus Wi-Fi Reliability on the BSICT Second-Year Students' Academic Performance" assessed how campus Wi-Fi reliability affects the academic performance of second-year BSICT students at Surigao del Norte State University. Using a descriptive quantitative approach, students completed an online survey about their experiences with Wi-Fi consistency, coverage and speed and their responses were compared with course grades. The results showed that most students were satisfied with network access and reach but uneven connection speeds often disrupted their coursework. These findings point to the need for improvements such as upgrading to higher frequency access points, better placement of network hardware and ongoing monitoring of performance to ensure stable high-speed connectivity and support student learning in technology driven programs.*

Keywords: Academic Performance, Campus Digital infrastructure, Campus WI-FI Reliability, Connectivity Issues

I. INTRODUCTION

In recent years, the rapid advancements in technology have significantly transformed the educational landscape, making internet access an indispensable tool for students. The study assessed the crucial link between the reliability of campus Wi-Fi and the academic performance of second-year BSICT students. In the current digital era, where online learning platforms, research databases, and collaborative tools are increasingly prevalent, a stable and consistent internet connection is paramount for students to succeed in their studies. The research study aimed to shed light on the effect of unreliable Wi-Fi on the academic performance of BSICT second-year students, a cohort whose academic success is intricately tied to their ability to access and utilize online resources effectively. The findings of the study contributed valuable insights into the challenges faced by students in technologically driven learning environments and provided recommendations for improving the overall learning experience.

Several studies have assessed the role of WiFi in higher education, particularly its effects on student performance and learning environments. [1] Ferreira et al. (2020) analyzedWiFi usage among 3,030 students over five semesters, finding a strong positive correlation between daytime WiFi use and academic performance, especially for juniors and seniors. They also observed peer effects, where students' performance aligned with that of their frequently encountered Wi-Fi sharing peers. Similarly, [2] Swain et al. (2023) leveraged WiFi network logs to infer student collocation and its effects on academic success, showing that students who spent more time together in shared WiFi locations performed better. The study emphasizes the potential of WiFi logs as a scalable, cost-effective tool for analyzing academic interactions and student well-being. [3] O'Brien et al. (2022) took a different approach, investigating how WiFi usage habits impact academic performance and student well-being. Analyzing over 2.5 million user sessions, they found that distraction activities, such as social media and online shopping, outweighed educational activities. Their findings suggest that universities should adopt measures to limit digital distractions, such as awareness programs and website restrictions. Other studies have focused on the technical aspects of WiFi reliability andoptimization in educational institutions. [4] Yunanta and Susyanto (2024) conducted an experimental study comparing the performance of 2.4 GHz and 5 GHz WiFi networks in an academic environment. Their findings indicate that 5 GHz networks provide superior Quality of

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Service (QoS), including better throughput, lower delay, and improved stability, making them a more suitable option for educational institutions. Additionally, [5] 7SIGNAL (2024) emphasized the importance of WiFi optimization in higher education, highlighting common challenges such as slow speeds, dead zones, and network congestion. The article underscored the need for continuous investment in Wi-Fi infrastructure to enhance learning experiences and student satisfaction, as poor network performance could impact academic outcomes and even influence students' university choices. Together, these studies illustrated the significance of both Wi-Fi accessibility and optimization in shaping the modern educational landscape.

Despite extensive research on the effects of Wi-Fi reliability on student academic performance, there remained a lack of studies specifically addressing how unstable internet access affected second-year Bachelor of Science in Information Technology (BSICT) students. Previous research had primarily focused on general student populations or online learning environments, yet little attention had been given to how connectivity issues influenced second-year IT students, who relied heavily on stable internet access for coding, cloud-based tools, and online collaboration. Furthermore, while some studies had explored the psychological effects of poor Wi-Fi on students, there was limited research linking these challenges directly to academic outcomes in IT-related courses. The study sought to bridge this gap by investigating the specific effects of campus Wi-Fi reliability on the academic performance of BSICT second-year students, offering insights that could guide universities in enhancing their digital infrastructure to better support technology-driven education.

To address these gaps, the study proposed a quantitative research approach, utilizing surveys and academic performance analysis to assess the effects of campus Wi-Fi reliability on BSICT second-year students. By conducting a structured survey among students and analyzing their academic records in relation to internet stability, the research aimed to provide empirical evidence on how connectivity issues affect their learning experiences and outcomes. The findings were expected to help university administrators and policymakers make informed decisions regarding the improvement of campus Wi-Fi infrastructure, ensuring that students, particularly those in IT-related courses, had uninterrupted access to essential online resources. Additionally, the study contributed to the growing body of knowledge on digital learning environments, offering insights that could guide future research on the intersection of technology accessibility and academic success. Ultimately, improving campus internet reliability could enhance student performance, reduce academic stress, and create a more conducive learning environment for future IT professionals.

This study assessed the effect of campus Wi-Fi reliability on the academic performance of second-year BSICT students. The research examined the extent to which unstable internet access affected academic activities and coursework, assessed the relationship between Wi-Fi reliability and student engagement, productivity, and learning outcomes, and proposed strategic solutions to improve campus Wi-Fi infrastructure and support technology-driven education.
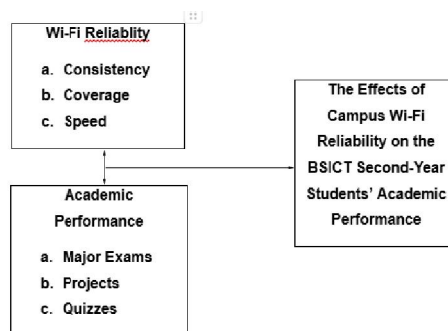

Fig. 1 Aconceptual framework of the study

Fig.1 presented a conceptual framework that examined the relationship between campus Wi-Fi reliability and the academic performance of second-year BSICT students. The framework posited a direct relationship, operationalizing Wi-Fi reliability through three measurable components: consistency (defined as the stability and dependability of the connection, with frequent disruptions indicating low consistency); coverage (defined as the signal's geographical reach across campus, with poor coverage limiting student access); and speed (defined as the data transfer rate, with slow

speeds hindering efficient task completion). This multi-faceted operationalization provided a more nuanced understanding of Wi-Fi reliability than a single, global measure would have allowed. Academic performance, the dependent variable, was similarly operationalized through three measurable aspects: major exam scores, project quality and timeliness, and quiz performance. This breakdown facilitated a detailed analysis of how Wi-Fi reliability might differentially affect various aspects of academic performance. The framework depicted a direct relationship, implying that improvements in Wi-Fi consistency, coverage, and speed would lead to better academic performance across all three measured aspects. While Fig.1 offered a clear and concise model for investigating this relationship, its simplicity highlighted the need for future research incorporating potentially influential mediating and moderating variables to achieve a more robust and comprehensive analysis.

II. RESEARCH METHOD

A. Research Design
The study employed a descriptive research design with a quantitative approach to assess the relationship between campus Wi-Fi reliability and academic performance of 2nd year BSICT students. The chosen research design was deemed appropriate as the study aims provide a clear understanding of how Wi-Fi reliability affects students' academic performance and to gather valuable insights that could guide improvements in campus infrastructure and student success.

B. Participants and Sampling Method
The study involved 96 participants selected through convenience sampling. The inclusion criteria required participants to be second-year BSIT students currently enrolled in Surigao del Norte State University, actively using the campus Wi-Fi for academic purposes, and having consistent access to the Wi-Fi network throughout the academic year, ensuring familiarity with its reliability and performance in relation to their academic activities.

C. Data Collection Methods
Data was collected using a structured questionnaire, which was distributed to participants through Google Forms. The survey consisted of a total of 27 questions, including a section for demographic information, such as email, name (optional), course, year, section, gender, and age, all kept confidential. The main body of the survey included 27 questions, with 9 questions each dedicated to assessing the consistency, coverage, and speed of Wi-Fi reliability. Ethical approval was obtained prior to data collection to ensure the study adhered to ethical standards.

D. Data Analysis Techniques
Quantitative data were analysed using descriptive statistics, specifically the mean, median, and mode, which allowed for the summarization and interpretation of numerical data related to the participants' responses. These statistical measures provided a clear picture of the trends and patterns within the data, helping to quantify the extent of the relationship between campus WiFi reliability and the academic performance of second year BSICT students. The analysis was conducted using Jamovi, a statistical software that facilitated accurate and efficient computation of these results. In addition, qualitative responses were thematically analysed to identify emerging patterns, key themes, and underlying insights. This process involved organizing the qualitative responses into categories based on common themes and patterns, which helped to uncover key insights into participants' experiences and perceptions of WiFi reliability. By analysing these responses in conjunction with the quantitative data, the study aimed to offer a well-rounded understanding of the research problem, providing both statistical trends and deeper, subjective perspectives from the participants.

TABLE 1:Parameter Limits

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

III. RESULTS AND DISCUSSION

A. User Experience Measures

This section assessed the effects of campus Wi-Fi reliability on the academic performance of second-year BSICT students using survey responses. Tables 3–5 presented the results, including mean scores, standard deviations, and verbal interpretations (refer to Table 2 for the verbal interpretation scale). These interpretations (e.g., "Low Degree," "High Degree") provided a qualitative understanding of student responses.

TABLE 2: The results in terms of Consistency

Statements	Mean	Verbal Interpretation	Quantitative Description
Consistency			
The consistency of campus Wi-Fi allows me to…			
Q1. submit exam requirements on time.	3	Agree	High Degree
Q2. take online exams without disruptions.	2.97	Agree	High Degree
Q3. stay focused during online exams.	3.09	Agree	High Degree
Q4. submit projects on time without technical delays.	3.03	Agree	High Degree
Q5. gather reliable information for my projects.	3.26	Strongly Agree	Very High Degree
Q6. present my projects smoothly.	3.14	Agree	High Degree
Q7. take online quizzes without interruptions.	3.10	Agree	High Degree
Q8. maintain focus during quizzes.	3.13	Agree	High Degree
Q9. avoid technical issues during online quizzes.	2.98	Agree	High Degree
Average:	**3.07**	**Agree**	**High Degree**

Table 2 presented survey results assessing students' perceptions of campus Wi-Fi consistency and its impact on academic task completion. The data revealed a largely positive perception, suggesting that students generally found the Wi-Fi sufficiently reliable for most academic activities. An overall average mean score of 3.07 ("Agree," categorized as "High Degree") demonstrated a predominantly positive assessment of Wi-Fi consistency, indicating that significant disruptions rarely hampered academic work. Students expressed a "High Degree" of agreement (mean scores above 2.75, assuming a typical Likert scale) across most items, signifying that consistent Wi-Fi access positively impacted their ability to submit assignments (Q1, Q4), complete online exams (Q2, Q3), and finish quizzes (Q7, Q8, Q9) without major technical issues.

The strong agreement regarding reliable information gathering for projects (Q5, "Very High Degree") further highlighted the importance of reliable internet access for research. While the overall assessment was positive, some areas suggested potential for improvement. The slightly lower mean scores for maintaining focus during online exams (Q3, 3.09) and quizzes (Q8, 3.13), though still indicating agreement, hinted that minor inconsistencies may have occasionally affected concentration. In conclusion, Table 2 indicated a generally positive perception of campus Wi-Fi consistency, emphasizing its crucial role in academic success. However, the findings also suggested a need to minimize even minor disruptions to enhance student focus and performance. Future research incorporating objective measures of Wi-Fi performance and its direct correlation with academic outcomes was recommended.

TABLE 3 : The results in terms of Coverage

Statements	Mean	Verbal Interpretation	Quantitative Description
Coverage			
Using campus Wi-Fi coverage helps me to…			
Q1. take my online exam without connection issues.	2.88	Agree	High Degree
Q2. submit online exams on time.	3.12	Agree	High Degree
Q3. review for exam in different study areas.	3.09	Agree	High Degree
Q4. research efficiently for my major projects.	3.18	Agree	High Degree
Q5. submit projects on time.	3.10	Agree	High Degree
Q6. present projects without technical issues.	3.05	Agree	High Degree
Q7. review online resources before taking quizzes.	3.26	Strongly Agree	Very High Degree
Q8. access educational websites for quizzes without disruptions caused by limited Wi-Fi coverage.	3.03	Agree	High Degree
Q9. access online quizzes anytime and anywhere on campus.	2.90	Agree	High Degree
Average:	**3.06**	**Agree**	**High Degree**

Table 3 presented survey results assessing students' perceptions of campus Wi-Fi coverage and its impact on academic activities. The data indicated a generally positive perception, suggesting that Wi-Fi coverage was largely sufficient for most academic tasks. An average mean score of 3.06 ("Agree," categorized as "High Degree") demonstrated a predominantly positive assessment. However, a more detailed analysis revealed some nuances. Students expressed a "High Degree" of agreement (mean scores above 2.75, assuming a typical Likert scale) for most items, indicating that adequate Wi-Fi coverage positively influenced their ability to complete exams (Q1, Q2), submit assignments (Q2, Q5), conduct research (Q4), and prepare for quizzes (Q7, Q8).

The strong agreement regarding access to online resources before quizzes (Q7, "Very High Degree") underscored the importance of reliable coverage for effective learning. Despite this overall positive assessment, some items suggested areas for potential improvement. Lower scores for accessing quizzes anytime and anywhere (Q9, 2.90) and completing online exams without connection issues (Q1, 2.88) hinted at less reliable coverage in specific locations or times. In conclusion, while Table 3 revealed a generally positive perception of campus Wi-Fi coverage, highlighting its importance for academic success, the findings also suggested that addressing coverage issues in specific areas could further enhance the student experience. Future research incorporating objective measures of Wi-Fi coverage and its correlation with academic outcomes was recommended.

Table 4 presented survey results assessing students' perceptions of campus Wi-Fi speed and its impact on their academic work. The data revealed a generally positive but nuanced perception, suggesting that while Wi-Fi speed was largely sufficient for most tasks, specific areas showed room for improvement. An average mean score of 2.97 ("Agree," categorized as "High Degree") indicated a predominantly positive assessment of Wi-Fi speed. Students demonstrated a "High Degree" of agreement (mean scores above 2.75, assuming a typical Likert scale) for most items, indicating that sufficient Wi-Fi speed positively influenced their ability to access learning materials (Q1), complete online exams (Q2, Q3), manage projects involving large files (Q4), watch tutorial videos (Q5), submit projects timely (Q6), and access quiz platforms (Q7). High agreement scores for accessing quiz platforms (Q7, mean 3.10) and watching tutorial videos (Q5, mean 3.10) highlighted the importance of adequate speed for these tasks.

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TABLE 4: The results in terms of Speed

Statements	Mean	Verbal Interpretation	Quantitative Description
Speed			
The speed of campus Wi-Fi helps me to…			
Q1. access online review materials quickly while preparing for midterms and final exams.	3.07	Agree	High Degree
Q2. take online exams, such as midterms and finals, without interruptions or delays.	2.93	Agree	High Degree
Q3. take online exams smoothly without experiencing buffering or lag.	2.88	Agree	High Degree
Q4. complete projects that require downloading and uploading large files.	2.85	Agree	High Degree
Q5. watch tutorial videos and online references that support my project development.	3.10	Agree	High Degree
Q6. submit projects on time without Wi-Fi-related delays.	2.92	Agree	High Degree
Q7. access quiz platforms like Google Forms without technical issues.	3.10	Agree	High Degree
Q8. stay focused on answering quizzes without Wi-Fi disruptions.	2.98	Agree	High Degree
Q9. complete timed online quizzes without connectivity interruptions.	2.96	Agree	High Degree
Average:	**2.97**	**Agree**	**High Degree**

However, lower scores for completing projects with large files (Q4, 2.85), completing online exams without delays (Q2, 2.93), and maintaining focus during quizzes (Q8, 2.98) suggested that insufficient speed occasionally impacted performance, particularly on time-sensitive tasks. In conclusion, while Table 4 indicated a generally positive perception of Wi-Fi speed and its importance for academic success, the findings also highlighted the need to address speed limitations to further enhance the student experience. Future research incorporating objective speed measurements and their correlation with academic performance was recommended.

The findings consistently demonstrated a low to very low degree of satisfaction among students regarding the campus Wi-Fi's consistency, coverage, and speed in supporting academic performance. Across all three tables, students generally disagreed that the current Wi-Fi setup allowed them to perform essential tasks such as taking exams and quizzes, submitting projects, and accessing online resources without disruptions. The overall low mean scores reflected recurring connectivity issues that hindered academic productivity. These results highlighted the need for improved campus internet infrastructure to ensure reliable and uninterrupted access to digital learning tools and platforms

IV. CONCLUSION

This study explored the effects of campus Wi-Fi reliability on the academic performance of second-year BSICT students. The findings revealed a negative impact of unstable internet access on academic activities and coursework, resulting in delays and limited access to essential materials. A strong correlation emerged between Wi-Fi reliability and student engagement, productivity, and learning outcomes, with poor connections leading to decreased participation and motivation. These findings underscored the critical need for improved campus internet infrastructure to support effective technology-based learning.

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