The Relationship Between Computer Laboratory Usage and Preliminary and Midterm Performance in Selected Core BSIT Subjects at STI College Malolos with the Integration of a Web-Based Research and Visualization Tool

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ABSTRACT

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The impact of hands-on practice in computer laboratories on academic outcomes is affirmed by literature, yet existing studies often overlook performance shifts within the current academic term. This quantitative correlational study addresses that gap by examining the relationship between computer laboratory usage and the measurable change in academic performance of BSIT students at STI College Malolos between the Preliminary and Midterm grading periods. The research is guided by the hypothesis that higher laboratory usage, measured by two metrics— **Frequency (Attended Hours per Week)** and **Intensity (Percentage of Hands-on Activity)**— is associated with a positive Performance Change Score. The methodology employs **Purposive Sampling** to select 145 respondents from a total population of 501, ensuring statistical generalizability and adherence to the critical requirement of possessing paired grade records. Data will be collected via a **structured, self-reported survey** administered through a **Mixed-Mode Strategy**, utilizing assurances of anonymity to mitigate the inherent bias of self-report. Analysis will employ Descriptive Statistics, Pearson r correlation to fulfill Objectives 2 and 3, and Multiple Linear Regression to formally test the null hypothesis against Objective 4 (Performance Change Score). The output includes the development of a web-based visualization tool to make the statistical findings immediately accessible for institutional review, offering empirical evidence to guide decisions on laboratory resource management and instructional design.

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Chapter I
Introduction

Information Technology (IT) education is fundamentally practical, relying heavily on dedicated facilities where theoretical concepts are translated into applied skills. At institutions like STI College Malolos, computer laboratories are central to training, providing the necessary environment for students to run code, configure networks, and engage in hands-on practice, which local and international studies affirm is tied to stronger student outcomes and competence. While the positive impact of supervised laboratory access on technical tasks is well-documented, existing research predominantly focuses on general, end-of-term results. What remains critically less examined is the **longitudinal shift** in academic performance— specifically, how changes in laboratory usage **frequency and intensity** correspond to measurable performance change between the Preliminary and Midterm grading periods. This quantitative study addresses that gap by examining the relationship between computer laboratory usage and the academic performance trajectory of core Bachelor of Science in Information Technology (BSIT) students, offering a precise understanding of how applied practice supports measurable progress across the academic term.

A. Background of the Study

At Systems Technology Institute or STI College Malolos, computer laboratories play a central role in IT training— this is where lecture material becomes concrete, where students run code, configure networks, and practice the small but essential tasks they will repeat on the job. Local work shows that strong Information and Communications Technology (ICT) integration is tied to better student outcomes (Escubido et al., 2025), while international studies point to the way access to electronic facilities and computing resources strengthens student competence in applied learning (Sharif-Nia et al., 2024).

When labs are scheduled, staffed, and kept in working order, they provide steady practice, on-the-spot troubleshooting, and supervised development of technical ability. Research on managed laboratory systems abroad reports measurable gains in applied competence (Farag, 2018), and local findings confirm that students with regular, guided access to computer laboratories perform better in programming and related technical tasks (Canoy et al., 2023).

The impact of ICT laboratories on BSIT students has been the subject of ongoing research; however, much of the existing work has focused on general outcomes measured at the end of the term. **What remains less examined is how academic performance shifts across the semester as laboratory exposure increases**, particularly during the transition from Preliminary to midterm periods, when hands-on requirements typically become more consistent. This study will address that gap by examining the relationship between laboratory usage and academic performance across these two grading periods, allowing for a more precise understanding of how increased access to laboratory-based practice may correspond to changes in student performance within the BSIT program.

B. Research Questions

For BSIT students at STI College Malolos, the computer laboratory is more than just another classroom— it is often the primary place where they can put lecture concepts into practice, especially for those without personal devices capable of handling programming, database, or networking tasks. Because of this reliance on shared resources, the following questions arises and it is what this study seeks to answer:

Central Question: Does computer laboratory usage— measured through attended laboratory hours per week and the percentage of hands-on activity during laboratory sessions— correspond to changes in academic performance between the Preliminary and midterm grading periods in selected BSIT core subjects at STI College Malolos?

1. What is the relationship between laboratory usage and Preliminary academic performance?
2. What is the relationship between laboratory usage and midterm academic performance?
3. Is increased laboratory usage associated with positive performance change between the Preliminary and midterm grading periods?

For the purpose of providing a formal, testable framework for this quantitative study, the research questions are accompanied by the following hypotheses, which are grounded in the expected relationship between applied practice and measurable progress :

- **Alternative Hypothesis (H_1):** Higher laboratory usage is associated with a positive change in academic performance between the preliminary and midterm grading periods.
- **Null Hypothesis (H_{01}):** Laboratory usage is not associated with a significant change in academic performance between the preliminary and midterm grading periods.

The intent, then, is not simply to record the time students spend in the laboratory— it is to determine whether such engagement has a meaningful connection to academic improvement across the semester. By focusing on two distinct grading periods, this study seeks to clarify whether the laboratory setting functions as a space of active learning that supports measurable academic progress, or whether it mirrors differences that students already possess prior to entering the course.

C. Significance of the Study

This study is significant because it provides a precise, data-driven understanding of how the frequency and intensity of hands-on computer laboratory engagement relate to student academic progress within the current academic term. By focusing on the performance change between the Preliminary and Midterm grading periods, the research will deliver evidence to support pedagogical and administrative decisions regarding the optimal use and scheduling of critical ICT resources. The importance of the study is directly reflected in the fulfillment of its objectives, which are enumerated below, alongside the general aim of the research.

General Objective: To examine the relationship between computer laboratory usage and changes in academic performance across the Preliminary and midterm grading periods in selected core BSIT subjects at STI College Malolos.

1. To measure the frequency and intensity of computer laboratory usage among BSIT students, in terms of laboratory hours attended per week and percentage of hands-on activity during laboratory sessions.

2. To determine the relationship between computer laboratory usage and Preliminary academic performance.
3. To determine the relationship between computer laboratory usage and midterm academic performance.
4. To assess whether increased laboratory usage corresponds to positive performance change between the Preliminary and midterm grading periods, using a computed performance change score.
5. To develop a web-based tool for survey distribution, data visualization, and dissemination of findings.

The successful achievement of these objectives will yield distinct benefits to various stakeholders, ensuring the research helps improve practice across the institution:

- **To Students.** The study may help BSIT students understand how their use of laboratory time influences not only their grasp of course concepts but also how their performance changes over the semester. This knowledge can encourage students to make more intentional use of hands-on practice, particularly during periods when skill development is still forming.
- **To Faculty and Instructors.** Instructors may gain insight into how students respond to laboratory activities across different grading periods. Knowing when practical work contributes most to performance can support the design of laboratory exercises that are paced, scaffolded, and aligned with student learning needs.
- **To Institutions.** The findings may help the institution maintain and improve laboratory access and scheduling. Understanding how laboratory use influences performance over

time can guide decisions on capacity, maintenance, and allocation of equipment, ensuring that learning environments remain supportive and effective.

- **To Policymakers and Administrators.** The results can be used by administrators to better schedule lab use and establish fair access policies. Well-structured materials and unambiguous rules guarantee that students can utilize the facilities to their full potential.
- **To Future Researchers.** This study lays the groundwork for future investigations into how laboratory exposure supports the development of technical skills throughout a semester. It makes room for additional research that can verify, improve, or broaden these conclusions in various settings.

In conclusion, the study matters on several levels— it is academically significant for students seeking to understand how laboratory experience contributes to their learning progress, and for instructors designing lessons that benefit from hands-on practice. Furthermore, it is practically significant for institutions maintaining resources and for administrators planning equitable facility access. By successfully carrying out both the quantitative analysis and the development of the web-based research and visualization tool, the study demonstrates how computer laboratories are not just spaces for equipment, but important parts of how education is shaped and improved in a digital setting, **with the web-based tool explicitly designed to convert the statistical findings into an accessible format for immediate institutional review and subsequent educational improvement.**

D. Scope and Delimitations

This section defines the precise boundaries of the quantitative study, detailing what the research covers and what it intentionally excludes, ensuring the findings remain focused and interpretable within the study's parameters.

Scope of the Study

The core of this research is the **relationship between computer laboratory usage and changes in academic performance** in core BSIT subjects, specifically measured across the two grading periods of Preliminary and Midterm.

The **population and location** of this investigation are strictly centered on the **BSIT students** enrolled at **STI College Malolos**— the institution where the computer laboratory serves as a primary resource for practical instruction. The research is confined to the **current ongoing academic term**, focusing specifically on the completed **Preliminary and Midterm grading periods**. This allows for a direct analysis of performance shifts within the active learning cycle.

The study focuses on specific **key variables** required for the analysis: the **Independent Variables** of Laboratory Usage are measured using two critical metrics— **attended laboratory hours per week** and the **percentage of hands-on activity** during those sessions. These usage metrics are examined against the **Dependent Variables** of Academic Performance, which are defined as the students' **Preliminary Grades**, their **Midterm Grades**, and the resultant **Performance Change Score**— a computed difference between the two grading periods. Furthermore, the study concentrates only on **core IT subjects** that fundamentally require the use of the computer laboratory, intentionally excluding elective and general education courses where laboratory necessity may vary.

Delimitations of the Study

The research strictly excludes any BSIT students who do not have **both Preliminary and Midterm grades** available for the selected core IT subjects, as the paired records are fundamentally required for the quantitative analysis of performance change across the term.

A major constraint is the exclusive reliance on **self-reported data** for both laboratory usage and academic performance— including Preliminary and Midterm Grades— provided by the students through the survey; this method, which specifically omits support from external usage logs or direct observation, is acknowledged as a source that may introduce inaccuracy or bias. Furthermore, the scope of performance analysis is limited to grades and the change score, intentionally excluding other indicators of academic performance— such as class participation, project quality, or internship outcomes— which are outside the study's focus.

The research scope is also restricted to the current **academic term**— a boundary that means the results cannot be used to show longitudinal patterns or changes that may happen over multiple school years. Similarly, although they may influence grades, the study excludes external factors like private tutoring, the use of personal devices outside of the lab, and individual study habits. The independent variable of laboratory usage is strictly delimited to the utilization of institutional facilities during scheduled curricular hours, ensuring the analysis measures the impact of the school-provided learning environment rather than independent external practice. The emphasis remains solely on core IT courses, ensuring the exclusion of elective and general education subjects, and students from other academic programs are not included.

Finally, the analysis omits students who dropped classes, withdrew, or had incomplete grades, ensuring the respondent pool consists only of those who completed the academic periods under review. Due to these defined boundaries, the findings are limited to BSIT students enrolled in core IT subjects at STI College Malolos, and generalizations beyond this specific population are not intended.

E. Review of Related Literature

This section conveys the established knowledge and ideas about the research topic from published and unpublished materials, focusing on structured technology use, access to ICT resources, and digital skills development through laboratory practice. The purpose of this review is to organize existing knowledge relevant to the study, highlight the importance of computer-laboratory use in technical education, and identify the gaps in previous research.

Theme 1: Structured Technology Use and Its Impact on Academic Performance

The proper and organized way of using technology in computer laboratories is essential for improving learning for BSIT students. Students can focus, reduce stress, and apply theoretical concepts more successfully when laboratory activities are structured. When computer use is guided and properly controlled, it enhances focus, performance skills, and engagement—qualities that are critical for IT-related jobs where self-control and accuracy are needed.

A foreign study by Limniou (2021) examined the relationship between digital device usage and academic performance. With the findings showing that students who used their devices properly and under guided academic purposes outperformed those with unrestricted usage. On a similar note, a foreign study by Carter et al. (2017) found that students who were permitted to use laptops during class performed worse on tests, showing that uncontrolled gadget use can lead to distractions and weaker learning outcomes.

Another foreign study by Farag (2018) who created a Computer Laboratory Teaching Management System as a part of another international study to enhance classroom involvement and monitoring. During any lab session, the system ability to monitor student activities resulted in increased engagement, improved focus, and enhanced teamwork. A local study by Canoy et al. (2023) investigated the impact of computer lab usage on student performance in a local research. The research demonstrated the beneficial effects of frequent, supervised lab sessions on learning, but inadequate equipment, difficult scheduling, and the requirement for teacher preparation.

All four studies highlight the importance of structured and well-managed technology use in supporting student learning and performance. The foreign studies emphasize how control and guidance can enhance focus and engagement, while the local research points to real-world limitations in implementing these strategies. However, there is still limited evidence on how structured and guided computer-lab use directly affects students' short-term academic performance, particularly within BSIT programs where laboratory work is central to learning.

This study builds on those insights by examining how structured and guided use of computer laboratories— measured through attended lab hours and percentage of hands-on activity— relates to academic performance at two grading points (Preliminary and Midterm) and to the measured change between them.

Theme 2: Access to ICT Resources and Learning Outcomes

Access to ICT resources is of equal importance as studying concepts when it comes to BSIT Students, as it enables hands-on learning and practical application where they can practice programming, system configuration or any other technical skills in real time. In addition, it provides them with the opportunity to get familiar with the tools and equipment that is commonly used in IT-related careers. Moreover, fair access to these resources ensures that all learners have an equal opportunity to succeed in their studies and develop the essential skills they need in today's digital world.

According to a foreign study by Mohamed (2025), the availability and accessibility of ICT resources have a significant impact on students' academic performance. The researchers suggested that ICT resources should not be limited only to laboratories but should also include ICT centers that allow students to train in contextual and technical skills.

A local study conducted by Lorenzo (2016) stated that the iSchool Project implemented on Public High Schools in Tarlac are effective. However, they encountered some problems such as hardware failures, internet connection, limited access to the laboratory, and lack of maintenance of the equipment in the laboratory. This shows that while the project was a success, it would’ve been a lot better if the quality of the resources were better and if the teachers have the accessibility that they need in the ICT laboratories.

Another local study by Siega (2025) explored the relationship between technology usage and academic performance of computer engineering students at Makati Science Technological Institute of the Philippines. The findings revealed that the effective use of computer technology had a positive impact on students’ learning outcomes.

A related local study by Escubido et al. (2025) examined the correlation between ICT integration in teaching and perceived student performance among BSIT students at St. Mary’s College of Bansalan. The results showed that when ICT tools are effectively embedded in instruction, students tend to perform better academically. However, the study also emphasized that persistent limitations in technological resources continue to affect student innovation and academic progress. Alongside that is the raising of the need for improved access and integration of ICT in higher education.

All four studies highlight the importance of ICT resources and their relationship with academic achievement. Mohamed (2025) underscored the need to expand ICT accessibility beyond laboratories, while the local studies of Lorenzo (2016), Siega (2025), and Escubido et al. (2025) show that both access and effective use of ICT resources can significantly enhance learning outcomes.

These studies identify the effect of availability and accessibility of ICT resources and how this correlates to a better academic performance. Together, these findings indicate that ICT resources play an important role in student learning and outcomes. By focusing on BSIT students at STI College Malolos, this research extends the discussion by measuring how access and frequency of computer-laboratory use relate to academic outcomes. It directly responds to the gap in prior studies by analyzing how often and how intensively students use ICT laboratories—and how these patterns correspond to their Preliminary and Midterm grades, as well as the change in performance between these periods.

Theme 3: Digital Skills Development and Laboratory Practice

The previous theme highlighted the importance of access; this one focuses on how BSIT students develop their digital skills through laboratory work. The laboratory serves as a space for them to engage in real tasks such as coding, system configuration, and troubleshooting. It becomes a space not only for practice but also for exploration and collaboration, allowing students to experience how theories operate in real applications.

A foreign study by Vahid et al. (2023) examined how students' time spent on programming practice influenced their academic performance in an introductory computer science course. The researchers observed that those who consistently engaged in coding activities tended to achieve higher grades compared to peers who practiced less. While the study was conducted in an online environment rather than a physical lab, it pointed out the same principle— regular engagement in technical exercises directly supports stronger learning outcomes.

In another foreign study, Farag (2018) discussed how the structure and organization of computer laboratories contribute to student learning. Findings showed that a well-equipped and properly managed lab environment helps students become more confident in experimenting with tools and solving problems independently. Similarly, a local study by Cadiz-Gabejan and Takenaka (2021) explored how computer literacy affects students' performance in lab-based courses. Results from the study found that students with higher initial computer literacy were more likely to benefit from hands-on lab work and perform better in both practical and theoretical components.

All three studies agree that laboratory experiences significantly enhance both academic performance and technical ability. The foreign studies of Vahid et al. (2023) and Farag (2018) emphasize the importance of structured and sustained practice, while the local study of Cadiz-Gabejan and Takenaka (2021) highlights how individual computer literacy levels influence learning outcomes. However, further research is needed to explore how the frequency and nature of computer-laboratory activities influence students' immediate academic performance in IT-focused programs.

Overall, these studies point to the importance of regular computer-lab work in strengthening both the academic and technical performance of BSIT students. In the context of STI College Malolos, this study builds on that idea by examining how frequent and active use of laboratory facilities relates to students' grades in selected core IT subjects. Through observing patterns in laboratory participation, the study aims to give a clearer view of how continuous hands-on practice contributes to better understanding and overall performance in the program.

Synthesis of Literature

Looking across the reviewed literature, three main ideas come forward— the value of structure in using technology, the need for fair access to ICT resources, and the importance of continued laboratory engagement in shaping how BSIT students learn and perform. In the first theme, both Limniou (2021) and Carter et al. (2017) similarly raised attention to how guided and purposeful use of devices tends to improve focus and performance, while unregulated or excessive gadget use often results in distraction and lower academic outcomes. Alongside that, the studies of Farag (2018) and Canoy et al. (2023) showed that having an organized and well-managed laboratory system encourages students to take a more active role in class activities, yet both pointed out that issues such as limited equipment, scheduling conflicts, and lack of instructor readiness remains as a practical barriers. These studies together show that while structure and supervision in technology use bring clear advantages, their actual impact depends on how well schools can maintain the conditions that support them.

The second theme dealt with the question of access— how the presence or absence of ICT resources influences learning. Mohamed (2025), Lorenzo (2016), Siega (2025), and Escubido et al. (2025) each found that students perform better when the tools for learning are both reliable and within reach. From the reviewed studies, it shows that access to ICT resources often determines how well students can turn classroom lessons into usable skills. Yet, many institutions still struggle with uneven conditions— computers that fail too often, internet connections that break mid-task, and laboratories that students cannot always use when they need to. These problems make learning inconsistent, especially in schools that lack proper funding or maintenance. The studies point to a shared idea: technology can strengthen education, but only when the foundation supporting it is steady enough to hold that promise.

The third theme discussed how digital skills are cultivated through continuous and structured laboratory practice. Research by Vahid et al. (2023), Farag (2018), and Cadiz-Gabejan and Takenaka (2021) found that frequent hands-on experience improves both technical skills and academic understanding. Regular engagement in coding, troubleshooting, and practical tasks was shown to develop students' confidence and problem-solving ability. Yet, while these studies confirmed the importance of consistent laboratory practice, few directly examined how the frequency and nature of computer-laboratory activities influence students' immediate academic performance in IT-focused programs across distinct grading periods.

In summary, the reviewed literature reveals a clear pattern: structured technology use, reliable ICT access, and sustained laboratory practice all contribute to academic improvement, but each faces limitations that prevent their full potential. Existing research has yet to directly examine how the frequency and depth of lab engagement correlate with measurable outcomes across grading periods. Addressing this gap, the present study at STI College Malolos examines the relationship between the frequency and extent of computer-laboratory use and student performance in core IT subjects— offering new insights into how structured and consistent laboratory engagement supports learning outcomes in higher education.

F. Theoretical Framework

Learning is never limited to memorization or passive listening; it also depends on the environment where students apply concepts and construct understanding through experience. For Information Technology students, this environment is often the computer laboratory— a space where theoretical instruction meets practical engagement. To explain how such a setting may influence student performance, this section outlines the theoretical foundation of the study, drawing on three key educational theories— **Cognitive Load Theory**, **Constructivist Learning Theory**, and **Experiential Learning Theory**. They do not stand alone but rather speak to different sides of the same problem— how students handle information, how they build knowledge, and how they learn from direct experience.

Cognitive Load Theory, first introduced by John Sweller in the late 1980s, posits that students have limited mental capacity at a given time, and the way lessons or tasks are presented can either help or overwhelm them (Sweller, 1988). The theory points out three kinds of load: intrinsic load that comes from the natural difficulty of the subject, extraneous load that comes from unnecessary distractions or poorly designed tasks, and germane load which refers to the effort that goes directly into building knowledge. If we think about this in relation to computer laboratories, the connection becomes clear— a laboratory that is missing software, slow to run, or poorly managed can add to the extraneous load, making students spend energy on problems unrelated to learning. On the other hand, a system of consistent and guided usage, defined by high **attended laboratory hours per week** and a high **percentage of hands-on activity**, allows more of that mental effort to go toward germane load, where practice and repetition strengthen understanding. In this way, the frequency and intensity of computer laboratory usage can determine whether students are set up for real learning, and this efficiency is hypothesized to lead to a positive **Performance Change Score** between the Preliminary and Midterm grading periods.

While Cognitive Load Theory focuses on the mental side of learning, Constructivist Learning Theory on the other hand brings in the idea that knowledge is something students build rather than something handed down to them. With Jean Piaget that spoke about how learners reorganize their mental structures as they try to make sense of the tasks in front of them (Piaget, 1972), while Lev Vygotsky emphasized the social dimension— how learners grow when they are guided by teachers or peers within what he called the zone of proximal development (Vygotsky, 1978). These ideas fit naturally into the laboratory setting, because it is in such spaces that students test out concepts, make mistakes, and also learn from one another. Increased **attended laboratory hours per week** enhances the overall opportunity for active knowledge construction, while a high **percentage of hands-on activity** is the mechanism for testing and correcting mental models. Without access to reliable, active lab engagement, these opportunities shrink, and students are left with theory that is much harder to internalize. Constructivism therefore positions the laboratory usage— in both frequency and intensity— as a primary space where learning takes root through activity, collaboration, and guided exploration, which is expected to correlate with improved **preliminary** and **midterm academic performance.**

The third perspective, Experiential Learning Theory from David Kolb, adds another layer by showing how learning unfolds in cycles. According to this model, students move from doing to reflecting, then to forming new ideas, and finally to trying those ideas out again— a cycle that repeats and deepens understanding each time (Kolb, 1984). In the case of IT education, the lab provides the ground for the first step, concrete experience, such as debugging a piece of code or configuring a network. This study's independent variables define the rate of this experience: **Attended laboratory hours per week** determine the **frequency** of the concrete experience, while the **percentage of hands-on activity** defines its **depth and quality**. Students then think back on what went wrong or what worked, connect these observations to abstract principles, and test the ideas again in the next task. It is this process of looping between theory and practice that makes skills stick. To which the laboratory, then, is not just a place with equipment but a structured environment where this cycle of experience and reflection can happen. Quantitatively, this view implies that consistent, high-intensity laboratory usage provides more opportunities for experiential learning cycles, leading to improved skill mastery and a positive **Performance Change Score**.

Looking at these theories provides the basis for understanding how laboratory conditions may influence academic outcomes in measurable ways. **Cognitive Load Theory** links the frequency and quality of lab work to students' cognitive efficiency, which is essential for ensuring that increased attended laboratory hours are used efficiently. This efficiency enables the **Constructivist Learning Theory** process of active knowledge building, where high-intensity, hands-on activity is associated with active knowledge building through testing concepts and correcting mental models. Furthermore, this learning is repeatedly reinforced and internalized through the iterative cycle of **Experiential Learning Theory**, which connects repeated laboratory practice with the internalization of skills. Collectively, this synergy of reduced cognitive load and increased active, reflective practice provides a robust mechanism hypothesized to drive the relationship between consistent laboratory usage and a positive Performance Change Score in Information Technology courses.

CHAPTER II
METHODS

This chapter describes the systematic and detailed plan that will be executed to gather and analyze the necessary quantitative data. The procedures outlined— from the selection of participants to the final statistical testing— are grounded in a rigorous correlational design and are essential for addressing the research questions. This methodology ensures the study maintains internal validity and yields empirical evidence concerning the relationship between computer laboratory usage and academic performance change among BSIT students, defining not only what data will be collected but precisely how it will be transformed into knowledge to test the established hypotheses.

A. Research Design

The study utilized a **Quantitative Correlational Research Design**. This methodological choice is appropriate because the primary objective of the research is to examine the nature, degree, and direction of the statistical **relationship**— or correspondence— between the non-manipulated variables of computer laboratory usage and students' academic performance scores.

The correlational approach is therefore the most suitable method to answer the central research question: whether computer laboratory usage, measured through specific metrics, corresponds to measurable changes in academic performance between the Preliminary and Midterm grading periods. This design is focused on assessing the linear association between continuous numerical data— such as weekly lab hours, percentage of hands-on time, and self-reported grades— without attempting to establish a cause-and-effect link.

By employing this approach, the research will statistically calculate the extent to which varying levels of laboratory engagement are associated with different academic outcomes and the computed performance change, providing an empirical basis for testing the established hypotheses.

B. Participants and Sampling

This section details the target population, the rationale for the sample size, and the procedure used to select the participants for the study, which is essential for ensuring the validity of the correlational analysis.

Target Population and Sample Size

The target population for this study **is** the entire cohort of BSIT students enrolled at STI College Malolos. The total population (N) of BSIT students during this current academic term is determined to be 501, a figure acquired through a formal request for population data from the STI College Malolos School Registrar (Appendix A.) Using this figure, the researchers applied Slovin's formula to calculate the required minimum sample size (n), resulting in 145 respondents. This specific sample size ensures a rigorous standard of research, maintaining a 93% confidence level with an acceptable 7% margin of error, thereby establishing the statistical generalizability of the findings to the larger BSIT student population. Slovin's formula was utilized to establish the target sample size necessary for statistical power; however, the participant selection remains Purposive to strictly satisfy the non-negotiable inclusion criteria of possessing paired academic records.

Sampling Procedure

The selection of these participants employed **Purposive Sampling**. This non-probability technique was necessary because the study's design demands that participants meet strict, pre-defined academic criteria— a requirement that supersedes general ease of access. Specifically, every participant must be:

1. Currently enrolled in **core IT subjects** at STI College Malolos.
2. Capable of self-reporting or possessing the required **paired academic records** (Preliminary and Midterm grades) for the selected core IT subjects, as these records are **essential and non-negotiable for calculating the Performance Change Score, which forms the basis of the correlational analysis**.

The use of purposive selection thus ensured that the final sample was directly relevant to the study's scope, guaranteeing that all gathered data sets contained the necessary prerequisite variables for the rigorous analysis.

C. Data Collection Plan

This section will detail the systematic procedures that will be followed to gather the necessary quantitative data, covering ethical clearance, instrument distribution, and data compilation.

Ethical Clearance and Instrument Preparation

The data collection process **will begin** with the research group securing **formal written approval** (Appendix C) from the relevant institutional authorities to conduct the study among the BSIT student population. Simultaneously, the final **Structured Survey Instrumen**t (Appendix E) will be prepared and deployed as a digital form. The instrument **will be rigorously tested** for clarity and functionality to ensure accurate data capture for the key variables— lab usage metrics and self-reported grades— and to confirm the integrity of the screening questions used for participant eligibility.

Data Collection Procedure

The researchers **will secure formal written approval** from institutional authorities to conduct the study among the BSIT students. Data collection **will then follow** a **Mixed-Mode Strategy** to maximize respondent reach:

The primary mode of dissemination **will be Digital Distribution**. The survey link **will be distributed** through the project's **web-based research platform** (Appendix B)— which **will serve** as an embed host or redirect— as well as through direct digital channels like class group chats, text messages, or QR code distribution. This method **will ensure** efficiency and direct access for the digitally-fluent BSIT student cohort.

To ensure comprehensive inclusivity and as a contingency plan, a **paper-based version of the survey will be prepared**. This instrument **will be administered** in a controlled interview setting for any participants identified with limited digital access or technical difficulty. All paper responses **will be subsequently digitized** by the research team for uniformity before assimilation with the main data set. The entire process **will be conducted** over a predetermined period to ensure the data captured reflects the current academic term under review.

Ethical Considerations and Mitigation

Throughout the collection process, the researchers **will rigorously adhere** to ethical protocols to protect participant rights and mitigate potential bias:

Prior to accessing the survey questions, all participants **will be presented** with an **Informed Consent** (Appendix D) page or form detailing the research title, purpose, procedures, risks, and benefits. Participation **will be explicitly voluntary**, with the assurance of the right to withdraw at any time without penalty.

Crucially, **Confidentiality and Anonymity** will be strictly enforced. Data will be collected anonymously and subsequently aggregated for statistical analysis, ensuring that individual responses cannot be linked back to the participants. This commitment to anonymity will serve as the key procedural strategy to **mitigate social desirability bias, which is the risk inherent in relying on self-reported grades and usage data, thereby maximizing the veracity of the quantitative responses**. The collected data will be stored securely, with access restricted solely to the research team.

Data Compilation and Preparation

Upon conclusion of the collection period, the data **will be compiled** from both the digital and digitized paper sources into a single master spreadsheet. Responses **will be meticulously reviewed** to ensure adherence to the **Purposive Sampling** criteria and to confirm the integrity of the **paired grade records** reported for the same subject. The raw self-reported grade data **will then be processed** to calculate the **Performance Change Score**, preparing the final variables for the statistical analysis plan.

D. Data Analysis Plan

The collected quantitative data will be processed and analyzed using **Microsoft Excel** supplemented by the **Data Analysis ToolPak.** The analysis is designed to fulfill the General Objective, which is to examine the relationship between computer laboratory usage and changes in academic performance across the preliminary and midterm grading periods in selected core BSIT subjects at STI College Malolos.

Data Preparation and Tool

Prior to analysis, the self-reported numerical grades and lab usage responses will be cleaned and compiled into a single master data set. The raw self-reported numerical grades will be used to calculate the primary dependent variable, the **Performance Change Score** (Midterm Grade minus Preliminary Grade). The independent variables— the two **lab usage metrics**— will be the focal point of the prediction models:

1. **Frequency Metric:** Attended Laboratory Hours per Week

2. **Intensity Metric:** Percentage of Hands-on Activity

These two metrics, which are the measures of laboratory usage, will be treated as pseudo-continuous for the purpose of running linear statistical models. **Pseudo-continuous** is a necessary procedural designation meaning that while the data were originally collected using ordered, distinct categories— known as ordinal scales— they will be analyzed as if they represent measurements along a continuous scale. To facilitate linear regression and correlation analysis, the ordinal response ranges will be converted into scalar values using the Class Mark (Midpoint) method; for example, a selection of '2 to 4 hours' will be coded as 3.0, and '21%-40%' will be coded as 30.5%

Descriptive Analysis

Descriptive Statistics will be computed to fulfill **Objective 1, which is to measure the frequency and intensity of computer laboratory usage among BSIT students, in terms of laboratory hours attended per week and percentage of hands-on activity during laboratory sessions**. Mean, Median, and Standard Deviation will be calculated for all metrics to establish central tendency and variability, and frequency distributions will be generated. The focus will be on **summarizing and describing** the characteristics of the data collected from the sample so as to provide a concise, factual picture of what the data looks like within the sample.

Inferential Analysis

Inferential Statistics will then be employed, focusing on making **generalizations or predictions** about the larger BSIT population based on the results observed in the sample. This requires multiple, distinct calculations to test the formal hypotheses.

Pearson Product-Moment Correlation Coefficient (Pearson r)

Pearson r will be used to fulfill Objective 2, which is to determine the relationship between computer laboratory usage and Preliminary academic performance and Objective 3, which is to determine the relationship between computer laboratory usage and midterm academic performance. **Table E.1** lists the specific data pairings for this correlational analysis.

Table E.1: Data Pairings for Pearson r Correlation Analysis.

Calculation	Independent Data	Paired With Dependent Data	Research Objective Fulfilled
PR-1	Attended Laboratory Hours per Week (Frequency Metric)	Preliminary Grade	Objective 2
PR-2	Percentage of Hands-on Activity (Intensity Metric)	Preliminary Grade	Objective 2
PR-3	Attended Laboratory Hours per Week (Frequency Metric)	Midterm Grade	Objective 3
PR-4	Percentage of Hands-on Activity (Intensity Metric)	Midterm Grade	Objective 3

The research necessitates four separate correlation calculations because the two dimensions of lab usage— the Frequency Metric and the Intensity Metric— must be individually paired against both the Preliminary Grade (PR-1 & PR-2) and the Midterm Grade (PR-3 & PR-4.) This series of calculations reveals whether usage frequency or usage intensity is the stronger linear association with performance at the two distinct grading points, providing specific insight into which dimension of lab work is most effective.

Simple and Multiple Linear Regression

Regression models will be executed to formally address **Objective 4, which is to assess whether increased laboratory usage corresponds to positive performance change between the Preliminary and midterm grading periods, using a computed performance change score** and to test the Null Hypothesis, which posits that laboratory usage is not associated with a significant change in academic performance between the preliminary and midterm grading periods. **Table E.2** details the structure of these three predictive models.

Table E.2: Regression Models for Predicting Performance Change Score.

Model Type	Predictor Data Used (IVs)	Data Predicted (DV)	Purpose in Study
Simple Regression (Model A)	Attended Laboratory Hours per Week	Performance Change Score	To test the predictive power of Frequency alone on student improvement.
Simple Regression (Model B)	Percentage of Hands-on Activity	Performance Change Score	To test the predictive power of Intensity alone on student improvement.
Multiple Regression (Model C)	**BOTH** Lab Usage Metrics simultaneously	Performance Change Score	To establish the combined predictive power and identify the most significant

			predictor of improvement.

The research demands **three separate regression models** to comprehensively test the predictive validity of the usage metrics. The execution of **Simple Regression (Model A and B)** will individually test the predictive power of each usage metric on the **Performance Change Score**. Crucially, **Multiple Linear Regression (Model C)** will then be executed using **both metrics simultaneously** to determine their combined predictive power and to establish which specific usage dimension is the most statistically significant predictor of student improvement when controlling for the presence of the other metric. The significance of these models will serve as the conclusive test of the study's central premise regarding academic progress.

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Appendices

Appendix A. Letter of Request for Information

September 19, 2025

Ms. Maricel Eugenio
School Registrar
STI College Malolos
McArthur Highway, Brgy. Dakila, City of Malolos, Bulacan 3000

Subject: Request for Information of BSIT Student Population

Dear **Ms. Maricel Eugenio**,

In partial fulfillment of our requirements for Practical Research II, we, the Grade 12 students of ITMAWD Section A, respectfully request data regarding the number of BSIT students at STI College Malolos. This information will be used for the scope of our quantitative research study entitled:

"The Relationship Between Computer Laboratory Usage and Preliminary and Midterm Performance in Selected Core BSIT Subjects at STI College Malolos with the Integration of a Web-Based Research and Visualization Tool

The data provided will be treated confidentially and used solely for academic purposes. Your assistance will allow us to properly define the research population and proceed with our study accurately.

Your approval of our request would be greatly appreciated. Thank you for considering our study.

Sincerely,

SHAE C. ESPINO
Group Leader 1

Noted By:

MS. KATRINA FAITH C. ESGUERRA
Practical Research II Instructor

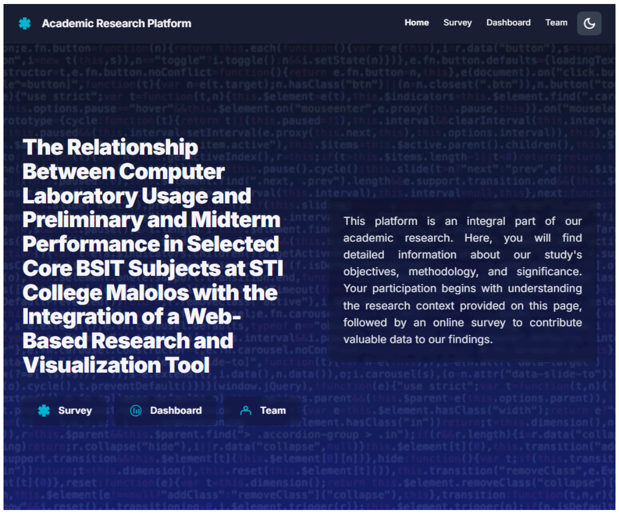
Reviewed By:

MS. EUNICE B. VALLEJOS
STI SHS Principal

MS. MARIEL MINORCA G. VALERIO
STI Academic Head

Appendix B: System Interface Screenshots

This appendix presents key screenshots of the developed web-based research and visualization tool, illustrating its main functionalities, including the homepage, research content display, survey interface, and data dashboard.



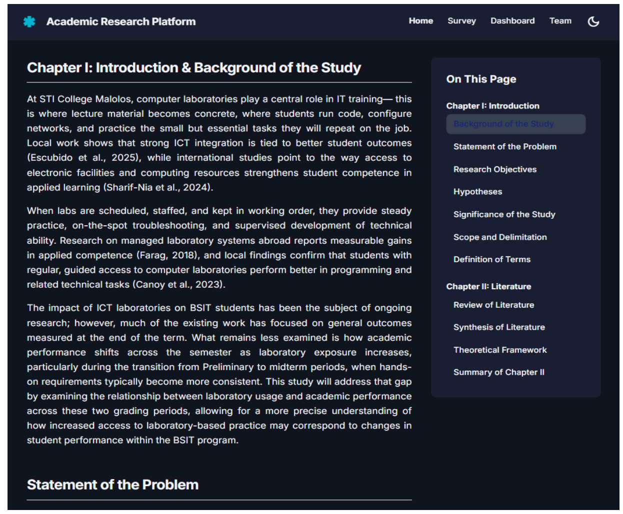
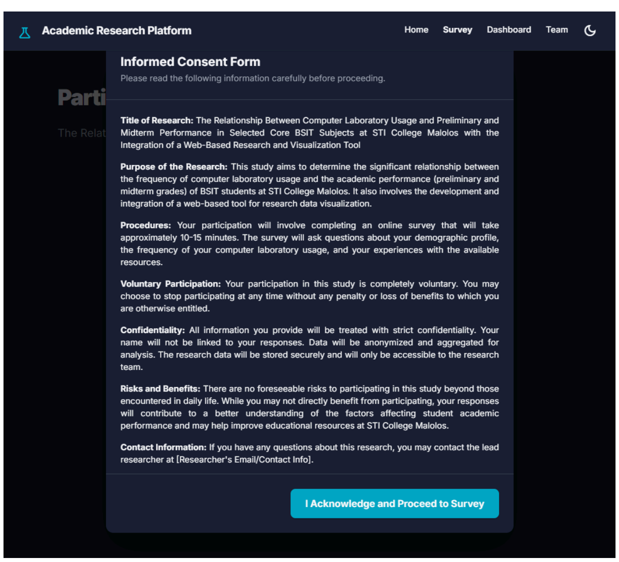


Figure B.1: Homepage Interface

This figure displays the main landing page of the web-based research platform, featuring the research title, a brief overview of the project, and navigation links to the survey, dashboard, and team information. It also shows the initial sections of Chapter I with an active Table of Contents for easy navigation.



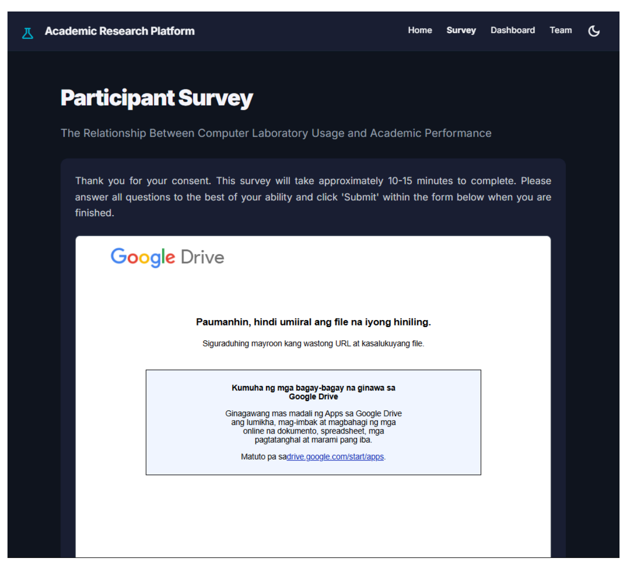
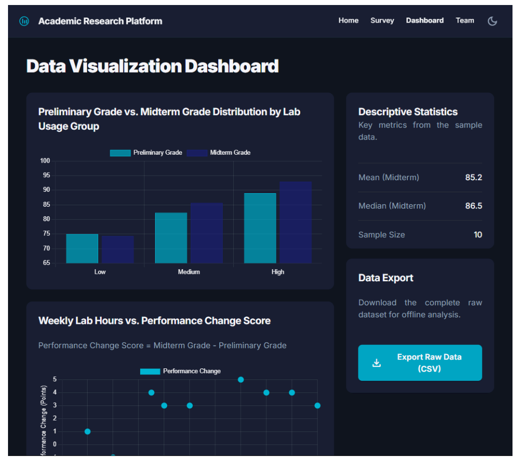


Figure B.2: Survey Interface

This figure displays the Informed Consent Form section of the platform. Participants must acknowledge and agree to the terms, which include details about the research title, purpose, procedures, voluntary participation, confidentiality, risks and benefits, and contact information, before proceeding to the survey. The other figure shows the actual survey embedded within the platform, where participants provide their responses. (Note: The screenshot indicates an issue with the Google Drive embed; in a final submission, this would ideally show a functioning survey.)

Figure B.3: Data Visualization Dashboard

This figure presents the Data Visualization Dashboard, a key component of the web-based tool. It displays graphical representations of the analyzed data, including comparisons of Preliminary vs. Midterm grades by lab usage group and the relationship between weekly lab hours and performance change scores. Descriptive statistics are also provided.



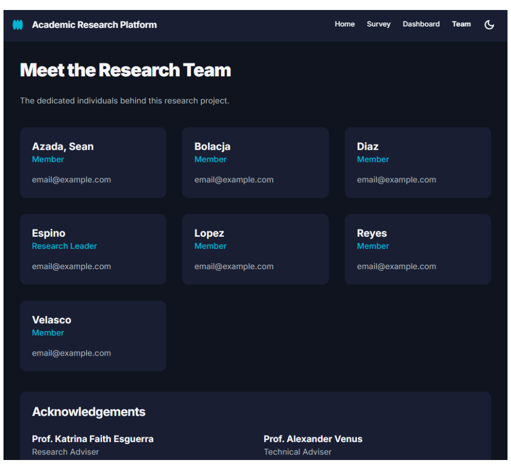


Figure B.4:
Meet the Research Team Page

This figure shows the "Meet the Research Team" page, introducing the members involved in the research project, along with their roles and contact information. It also includes acknowledgements for advisers.

Appendix C. Letter of Request for Conduct Study

November 00, 2025

Mr. Francis E. Salazar
Deputy School Administrator
STI College Malolos
McArthur Highway, Brgy. Dakila, City of Malolos, Bulacan 3000

Subject: Request for Permission to Conduct Survey

Dear **Mr. Francis E. Salazar**,

In partial fulfillment of our requirements for Practical Research II, we, the **Grade 12 students of ITMAWD Section A**, would like to respectfully ask for permission to conduct a qualitative research study at STI College Malolos entitled:

"The Relationship Between Computer Laboratory Usage and Preliminary and Midterm Performance in Selected Core BSIT Subjects at STI College Malolos with the Integration of a Web-Based Research and Visualization Tool"

The survey will be limited to the students of STI College Malolos. The study requires collecting numerical data— self-reported usage metrics and academic grades— via a structured, anonymous survey to statistically analyze the correlation between laboratory engagement and performance change.

We assure you that participation is entirely voluntary and confidential, and all data gathered will be used solely for academic and educational purposes to inform resource utilization.

Your approval of our request would be greatly appreciated. Thank you for considering our study.

Sincerely,

Sean Vincent A. Azada
Mark Justine C. Bolacja
Aaron Jhay L. Diaz
Shae C. Espino
Raver Lee E. Lopez
John Mark Anthony A. Reyes
Ma. Irish Pearl Y. Velasco

Noted By:

MS. KATRINA FAITH C. ESGUERRA
Practical Research II Instructor

Reviewed By:

MS. EUNICE B. VALLEJOS
STI SHS Principal

MS. MARIEL MINORCA G. VALERIO
STI Academic Head

Approved By:

MR. FRANCIS E. SALAZAR
Deputy School Administrator

Appendix D. Informed Consent

Title of Research: The Relationship Between Computer Laboratory Usage and Preliminary and Midterm Performance in Selected Core BSIT Subjects at STI College Malolos with the Integration of a Web-Based Research and Visualization Tool.

Purpose of the Research: This study aims to determine the **significant correlation** between the **frequency and intensity of computer laboratory usage** and the resulting **change in academic performance** (Preliminary and Midterm Grades) among BSIT students at STI College Malolos. It also involves the development of a web-based tool for research data visualization and dissemination.

Procedures: Your voluntary participation will involve completing a **structured, anonymous online survey** that will take approximately 5 to 10 minutes. The survey will ask you to self-report your **Preliminary and Midterm numerical grades** for a core IT subject, your weekly **attended laboratory hours**, and the **percentage of time spent on hands-on activity**.

Voluntary Participation: Your participation in this study is **completely voluntary**. You may choose to stop participating at any time without any penalty or loss of benefits to which you are otherwise entitled.

Confidentiality: All information you provide will be treated with **strict confidentiality** and collected anonymously. Your name will not be linked to your responses. Data will be **aggregated for statistical analysis** and stored securely, accessible only to the research team.

Risks and Benefits: There are no foreseeable risks to participating in this study beyond those encountered in daily life. While you may not directly benefit, your responses are crucial, as the aggregated findings will contribute to a better understanding of how hands-on practice affects academic progress and may help guide the institution in **improving laboratory resources and scheduling** .

Contact Information: If you have any questions about this research, you may contact the lead researcher at **shaeshishsg12@gmail.com**.

By clicking the button below, you acknowledge that you have read and understood the information above, that you voluntarily agree to participate in this study anonymously.

Appendix E. Research Instrument

STRUCTURED SURVEY QUESTIONNAIRE

A. **Section I:** Screening and Eligibility
   - **Question 1:** Are you currently an enrolled BSIT student at STI College Malolos? (Response: Yes / No)
   - **Question 2:** Are you currently enrolled in at least one core IT subject that requires mandatory, scheduled laboratory work this term? (Response: Yes / No)
   - **Question 3:** Do you have your self-reported Preliminary and Midterm grades available for that selected core IT subject? (Response: Yes / No)

B. **Section II:** Paired Academic Performance Data
   - **Question 4:** Please write the name and code of the single core IT subject for which you will report the following grades. (Response: Text Input)
   - **Question 5:** Please enter your final numerical Preliminary Grade for the subject you named above. (Response: Numeric Input: 75–100)
   - **Question 6:** Please enter your final numerical Midterm Grade for the same subject. (Response: Numeric Input: 75–100)

C. **Section III:** Computer Laboratory Usage Data
   - **Question 7:** On average, how many hours per week do you spend in the computer laboratory for *academic-related tasks* (including scheduled class time and extra lab time)?
     - Less than 2 hours
     - 2 to 4 hours
     - 5 to 7 hours
     - 8 to 10 hours
     - 11 hours or more
   - **Question 8:** During your total time in the laboratory, what percentage is spent on **hands-on, practical tasks** (coding, debugging, systems configuration, or troubleshooting hardware/software) versus non-practical tasks (research, socializing, theory review)?
     - 0% – 20% (Mostly Non-Practical/Theory)
     - 21% – 40%
     - 41% – 60% (Even Mix)
     - 61% – 80%
     - 81% – 100% (Mostly Practical/Hands-on)