The Effectiveness of Virtual Learning Environments for BSIT Students and Instructors: Addressing Usability, Accessibility, and Technological Barriers in Online IT Education

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Publication Date: 2025/05/24

Abstract: This study investigates the effectiveness of Virtual Learning Environments (VLEs) for Bachelor of Science in Information Technology (BSIT) students and instructors, focusing on the usability, accessibility, and technological barriers encountered in online IT education. As educational institutions increasingly adopt VLEs, the importance of a user-centered design grounded in Human-Computer Interaction (HCI) principles becomes vital to ensuring successful learning outcomes. Employing a mixed-methods approach, the research gathered data from 100 participants through surveys and interviews to assess their experiences with current VLE platforms. The findings revealed that while VLEs are generally effective and user-friendly, significant issues such as internet connectivity, interface complexity, and lack of technical support still hinder optimal usage. The study also found that most users, particularly first-year students, require better onboarding support to fully engage with these platforms. Overall, the research highlights the need for improved design strategies, accessible infrastructure, and enhanced digital literacy training to make VLEs more inclusive, functional, and supportive of both students and instructors in the BSIT program.

Keywords: Virtual Learning Environments, Usability, Accessibility and Technological Barriers.

How to Cite: Cachuela, Christian M.; De Juan, Alex J.; Medida, John Reico S.; Pagente, Jeremy O.; Relloza, Rey Jan P.; Cedie E. Gabriel; Reginald S. Prudente. (2025). The Effectiveness of Virtual Learning Environments for BSIT Students and Instructors: Addressing Usability, Accessibility, and Technological Barriers in Online IT Education. *International Journal of Innovative Science and Research Technology*, 10(5), 1264-1280. https://doi.org/10.38124/ijisrt/25may510.

I. INTRODUCTION

A. Background and Context

The advancement of technology has transformed the Field of education, with Virtual Learning Environments (VLEs) playing a big role in this transformation. Particularly in the field of Information Technology (IT), VLEs served as an essential tool that facilitate the accessibility, and interactive learning experiences. Human-computer Interaction (HCI) focuses on the design and interaction of the users and technology, emphasizing the need for intuitive, user-friendly interfaces that accommodate the diverse needs of students and instructors. Having a poor HCI design may lead to frustration and reducing the user engagement lowering the effectiveness of the VLE platform, particularly in the online IT education where is technological competence is crucial. The interaction between the students and VLEs platforms should be consistent to guarantee that the learners can easily navigate the platforms, access resources, and interact with their instructors in a meaningful way. This research discusses about the four categories of Usability, Accessibility, Satisfaction and Technological Barriers.

In the increasing reliance on VLEs platforms for online IT education, there remains a gap in understanding of how to address the barriers in a way that maximizes the experience in learning for both the students and the instructors. This Research aims to know the effectiveness of VLEs platforms in the BSIT education, focusing on identifying strategies to overcome usability, accessibility, and technological

ISSN No:-2456-2165

challenges. By integrating principles of human-computer interaction (HCI), the research will contribute to the development of a more inclusive, efficient, and the effectiveness of VLE platforms that enhance the educational experience for all users in the of IT education.

B. Research Problem

Virtual Learning Environments (VLEs) are becoming more and more popular in IT education, but usability, accessibility, and technological barriers still pose problems for BSIT students and teachers. Numerous online learning platforms might not be completely optimized for smooth learning experiences, which could cause problems with engagement, navigation, and efficient knowledge transfer. The efficacy of online IT education is further hampered by differences in access to technology and internet connectivity. The gap in the existing literature lies in the lack of a comprehensive understanding of how to effectively overcome the barriers of usability, accessibility, and technological limitations in VLEs, specifically within the context of IT education. In order to enhance the overall learning experience in VLEs for BSIT students and instructors, this study aims to identify these problems and suggest solutions.

C. Research Questions and Objectives

- What strategies can be implemented to improve the usability, accessibility, and overall effectiveness of VLEs in IT education?
- What usability challenges do BSIT students and instructors encounter when using VLEs?
- How does the design and interface of VLEs impact student engagement and learning outcomes in IT education?
- How satisfied are you with the quality and relevance of learning materials provided in VLE?

D. Objectives

To investigate and determine effective methods that can improve the usability, accessibility, and overall efficiency of Virtual Learning Environments (VLEs) in IT education. Through an analysis of the strengths and limitations of current VLE platforms, the study seeks to offer practical recommendations that can maximize user experience among students and teachers alike, ultimately leading to enhanced learning outcomes and participation in IT education.

To explore the particular usability issues faced by Bachelor of Science in Information Technology (BSIT) students and teachers while utilizing Virtual Learning Environments. Through the determination of typical pitfalls like navigation problems, technical problems, and user interface issues, the study aims to determine how these issues affect teaching and learning effectiveness, with the aim of proposing solutions to enhance user satisfaction and platform usability.

To investigate how Virtual Learning Environment design and interface affect student motivation and learning performance in IT education. This research will explore the connection between VLE attributes like layout, navigation, interactivity, and students' motivation, participation, and grades, with the goal of identifying the factors that lead to a better learning experience in IT courses.

https://doi.org/10.38124/ijisrt/25may510

To determine the extent of BSIT students' and instructors' satisfaction with the quality and relevance of learning materials made available in Virtual Learning Environments. Through feedback on content's usefulness, simplicity, and relevance in the VLEs, the study will determine where learning materials may need to be improved to make them align with education goals and benefit both instructors and students in IT education learning environment.

E. Justification and Significance

Virtual Learning Environments (VLEs) platforms has become increasingly useful in IT education, it is important to evaluate the effectiveness of these VLE platforms, specifically for students and instructors of Bachelor of Science in Information Technology (BSIT) who mostly rely on these Platforms for teaching and learning. While VLE platform offer flexibility and convenience, some usability, accessibility, and technological limitations can create barriers that limit students' engagement. These challenges can limit students from learning, and difficulties in navigating the VLE platform, affecting the effectiveness of online education in IT. This Research is important as it addresses these issues by examining their impact on both BSIT students and instructors. finding the specific problems and suggesting solutions, this research aims to make sure that online education in IT has meets the needs of both Students and Instructors. This Study seeks to improve the quality of VLE experiences, making them more accessible, user-friendly.

II. LITERATURE REVIEW

A. Overview of HCI Theories and Models

Human-computer interaction (HCI) has been challenged in recent years because of advanced technology requiring adoption of new applications and investigations of connection with other disciplines, to enhance its theoretical knowledge. Design thinking (DT), an innovative and creative problemsolving process, provides potential answers to the kind of knowledge and techniques designers can bring into HCI. This paper reports a systematic review of comparison between HCI design process and DT process (Seda. M, 2020). Human-Computer Interaction (HCI) researchers beginning their careers, surveys the research models and methods in use today and offers a general framework to bring together the disparate concepts. HCI spans many disciplines and professions, including information science, applied psychology, computer science, informatics, software engineering and social science making it difficult for newcomers to get a good overview of the field and the available approaches. The book's rigorous 'approach-and-framework' response is to the challenge of retaining growth and diversification in HCI research by building up a general framework from approaches for Innovation, Art, Craft, Applied, Science and Engineering. This general framework is compared with other HCI frameworks and theories for completeness and coherence, all within a historical perspective of dissemination success (John. L, 2021).

Cognitive Load Theory (CLT) has been used as a theoretical foundation for the development of conceptual models and hypothesis testing to explain how information systems, through their designs and search options, can induce IO. It was also employed in the design of learning resources to improve knowledge acquisition, and in understanding the misinformation caused by information excess during the COVID-19 pandemic (Sigolo. B, 2024). The System Usability Scale (SUS) is another important model, assessing users' perceptions of a platform's usability. By measuring ease of use and overall satisfaction, SUS highlights areas for improvement that can enhance engagement and help overcome technological barriers. Additionally, User-Centered Design (UCD) focuses on creating systems that prioritize the needs, preferences, and behaviors of users. In the context of VLEs, this means designing interfaces that are intuitive, accessible, and responsive to the diverse needs of both students and instructors, ultimately improving the overall user experience. These theories collectively provide a framework for creating effective, user-friendly, and engaging VLEs in IT education.

B. Review Recent Studies, Papers, and Advancements in HCI

Web-Based Virtual Learning Environment: A Research Framework and a Preliminary Assessment of Effectiveness in Basic IT skills Training

According to Piccoli, G. et. Al. (2021) internet technologies are having a significant impact on the learning industry. For-profit organizations and traditional institutions of higher education have developed and are using web-based courses, but little is known about their effectiveness compared to traditional classroom education. Our work focuses on the effectiveness of a web-based virtual learning environment (VLE) in the context of basic information technology skills training. This article provides three main contributions. First, it introduces and defines the concept of VLE, discussing how a VLE differs from the traditional classroom and differentiating it from the related, but narrower, concept of computer aided instruction (CAI). Second, it presents a framework of VLE effectiveness, grounded in the technologymediated learning literature, which frames the VLE research domain, and addresses the relationship between the main constructs. Finally, it focuses on one essential VLE design variable, learner control, and compares a web-based VLE to a traditional classroom through a longitudinal experimental design. Our results indicate that, in the context of IT basic skills training in undergraduate education, there are no significant differences in performance between students enrolled in the two environments. However, the VLE leads to higher reported computer self-efficacy, while participants report being less satisfied with the learning process. this study sought to understand how students perceived using technology for language distance learning as well as the difficulties they ran into. To collect the necessary data, a hybrid method combining quantitative and qualitative study design was used. The data was gathered using an interview schedule and a questionnaire. The results also showed a high degree of perceptions of the technology's utility, effectiveness, usability, and behavioral intention in their language distance learning. However, despite of high level of

https://doi.org/10.38124/ijisrt/25may510

perceptions, there were challenges experienced. The study identified the following difficulties: a poor internet connection, a lack of planning, access costs, poor comprehension, housework, unfavorable home learning settings, power outages, inadequate instructions, and a lack of communication (Peralta, J and Lambenicio, G. 2022).

➢ Current Solution

Web-Based Virtual Learning Environment: Modern organizations are increasingly adopting web-based solutions for School Virtual Learning Environment (VLEs) which allow for efficient training delivery and management. System like Enhancing Student Engagement Through UX in Virtual Learning Environment provide a scalable architecture that supports school instructor and students by giving userfriendly UI. The review uses a systematic approach to identify and analyze relevant literature on virtual learning environments and student engagement and academic achievement. The search strategy involves a comprehensive search of electronic databases and a manual search of reference lists. Findings: The review highlights the positive impact of virtual learning environments on student engagement and academic achievement. The analysis reveals that virtual learning environments offer various features and tools that can enhance students' motivation, interest, and involvement in learning (Rites. V, 2023).

> Limitations

Institutional Variability – Different schools have unique Virtual Learning processes, policies, and system infrastructures. A solution that works well for one institution may not be universally applicable.

> Analyze Existing Solutions Related to the Research Problem

Virtual Learning Environments (VLEs) are increasingly utilized in IT education; however, usability, accessibility, and technological barriers continue to hinder their effectiveness for BSIT students and instructors. Many existing solutions aim to enhance the usability and interaction of Virtual Learning Environments (VLEs), yet challenges persist. Research by Isibor (2020) highlights that while platforms like Blackboard and Moodle are widely adopted, they often suffer from poor navigation, unclear interface design, and a lack of adaptability, leading to user frustration and decreased engagement. Studies have shown that students and educators struggle to locate materials and tools efficiently, indicating a gap in how VLEs address user experience. While some improvements have been made, such as re-constructure the interfaces and refining navigation, existing VLEs still lack personalized learning experiences and fail to fully integrate modern Human-Computer Interaction (HCI) principles. These gaps highlight the need for further research, particularly in incorporating emerging technologies like artificial intelligence, gamification, and adaptive learning. This study is based on HCI theories, such as usability heuristics and engagement models, to evaluate and enhance VLEs. By addressing these challenges, this research aims to create a more effective and engaging digital learning experience. Additionally, disparities in access to technology and internet connectivity further limit the efficacy of online

https://doi.org/10.38124/ijisrt/25may510

ISSN No:-2456-2165

IT education. This study seeks to identify these challenges and propose solutions to enhance the overall learning experience in VLEs for BSIT students and instructors.

III. METHODOLOGY

A. Research Design

This study uses descriptive research design involves systematically collecting, analyzing, and interpreting data on existing conditions, trends, and relationships, with or without statistical methods design to assess the usefulness of Virtual Learning Environments (VLEs) for BSIT students and instructors. The research will utilize a mixed-methods approach, combining both quantitative surveys and qualitative interviews to ensure a comprehensive evaluation of VLE efficacy in online IT education. The quantitative data will focus on measuring usability, accessibility, and technological barriers, providing objective insights into the effectiveness of the VLEs. In contrast, qualitative data gathered from focus groups and interviews will offer a deeper understanding of user experiences, challenges, and perceptions, helping to contextualize the numerical findings and provide a more holistic view of the system's impact.

This study adopt a descriptive research design, that appropriate for allowing a clear explanation and analysis of how user-centered design (UCD) effective in Virtual Learning Environments (VLEs) in BSIT students. Through this approach, quantifiable data can be gathered on key factors such as student engagement, satisfaction, and ease of use (Casumpang Frank, Catabijan Vilser, Daque Daynalyn, Pama. James Zyrus, Pineda. Jhon Michael, Semeniego Noemilyn, Cedie E. Gabriel MIT,Reginald S. Prudente MIT, 2024).

B. Participants

The participants for this study will consist of BSIT students and instructors, as they are the primary users of the Virtual Learning Environment. A simple random sampling method will be employed to select participants, ensuring that each student and instructor has an equal chance of being included in the study. This will help minimize bias and increase the generalizability of the findings to the broader population of BSIT students and instructors.

C. Data Collection

Data for this study will be collected using two main methods: surveys and interviews. The surveys will gather quantitative data, which will focus on aspects such as usability, accessibility, and perceived barriers to the effective use of the VLE. Interviews will provide qualitative insights, exploring the user experience in more detail by capturing personal stories, opinions, and suggestions from the participants. The combination of these two methods will offer a well-rounded understanding of how the VLE performs and how it affects student and instructor engagement and satisfaction.

D. Data Analysis

This study will assess the effectiveness of Virtual Learning Environments (VLEs) for BSIT students and

instructors by exploring critical aspects such as usability, accessibility, and technological barriers in online IT education. To achieve this, the analysis will use a combination of descriptive statistics and thematic analysis. Descriptive statistics will be employed to examine survey responses, identifying patterns in usability, engagement, and satisfaction based on metrics like mean scores and frequency distributions. Likert-scale ratings will allow for comparisons of usability perceptions between students and instructors, highlighting any areas that require improvement. In addition, thematic analysis will be applied to interviews and observations to explore common challenges, user behaviors, and interaction patterns within the VLE. This qualitative approach will provide a deeper understanding of accessibility issues and technological barriers that may hinder effective use of the platforms. By combining both quantitative data and real user experiences, the study will offer valuable insights into the usability and effectiveness of VLEs, providing actionable recommendations for overcoming challenges and enhancing the learning experience for BSIT students and instructors.

E. Ethical Considerations

In this study, confidentiality and privacy will require to ensure participants' identities and responses are kept secure and anonymous, protecting personal information from unauthorized access and maintaining trust throughout the study (George, A., George, J. and Jenkins, J., 2024). Ethical considerations are crucial in ensuring that the research respects the rights and well-being of all participants. Informed consent will be obtained from all BSIT students and instructors before participation, with a clear explanation of the study's purpose, procedures, potential risks, and benefits. This will ensure that participants are fully aware of their involvement in the research. Additionally, confidentiality and data privacy will be strictly maintained throughout the study. Participant responses will be anonymized, and the collected data will be securely stored to prevent unauthorized access, safeguarding participants' privacy throughout the research process.

IV. ADVANCED HCI DESIGN

A. System Architecture

The proposed Virtual Learning Environment (VLE) System architectures identify and describe the behavior of, and interactions between, the components that comprise a software system. For distributed network applications, system engineers deploy and configure applications, servers, and gateways to model these components, their behavior, and their interactions. System architectures are analogous to blueprints in that they identify what needs to be modeled by programmer's band system engineers, and describe how these components interconnect. In addition, system architectures can be used to estimate a system's complexity and cost by identifying and describing the components that comprise the system. Accordingly, a system's architecture is commonly analyzed before it is implemented to ensure that the effort is consistent with owner's goals and priorities. Once a system has been implemented, a system architecture serves as documentation. By identifying the roles that each component plays within a system, a system architecture can be used to

ISSN No:-2456-2165

trace malfunctions and to configure or extend a system (Larry. D, 2019).

B. Features and Functionalities

The Virtual Learning Environment (VLE) incorporates several key features designed to enhance the online learning experience for both students and instructors. It includes user authentication and role management, allowing secure login access and personalized dashboards tailored to user roles. The system supports interactive course modules where instructors can upload and manage lectures, quizzes, assignments, and multimedia resources efficiently. Communication tools such as integrated chat, video conferencing, email, and discussion forums facilitate seamless interaction between students and instructors, as well as peer-to-peer collaboration. The VLE also provides progress tracking and analytics, offering real-

> Teachers Ui Login

time performance data to help users monitor their learning outcomes and instructional effectiveness. To ensure inclusivity, the platform includes accessibility options, such as adjustable font sizes, screen reader support, and lowbandwidth compatibility for users with limited internet access. Additionally, the system features notifications and alerts that automatically remind users about important tasks, including assignment deadlines, scheduled exams, and course announcements.

https://doi.org/10.38124/ijisrt/25may510

C. User Interface Design

The UI design prioritizes simplicity, consistency, and responsiveness. Based on HCI principles, the layout features intuitive navigation, clear icons, readable fonts, and mobile compatibility. The interface below:

VLE's Teacher Virtual Username Learning Password Environment 🗹 Remember me A Virtual Learning Environment (VLE) is an online platform that Sign in facilitates digital learning by providing tools for course management, communication, collaboration, and assessment, It enables students and teachers to interact, share resources, Forgot password? track progress, and engage in learning activities remotely. Examples include Moodle, Blackboard, and Google Classroom. Don't have an account? Register here

Fig 1: A Simple Login Page for Teachers

The Virtual Learning Environment (VLE) login page is an online platform that educational institutions use to facilitate digital learning. It offers resources for student evaluation, teamwork, communication, and course administration. The log-in container on the right side has each user's username and password for signing in. > Dashboard

Frame Course	ses/ Blocks				
Cou	rse				
	Student name	Course	Semester	Block	
1	Maria	BSHM	First	12	
2	Mario	BSIT	Second	2	
Bloc	ks Records				
	Student name	Course	Semest	ter	Block
1	Maria	BSHM	First		12
2	Macio	BSIT	Second	1	2
	Frame Course Course I 1 2 Bloc # 1	Frame Courses/Blocks Course / block Course # Student name 1 Maria 2 Mario Blocks Records # Student name 1 Maria	Frame Courses/Blocks Course / block Course * Student name Course 1 Maria BSHM 2 Maria BSHM Blocks Records * Student name Course 1 Maria BSHM	Frame Courses/Blocks Course / block	# Student name Course Semester Block 1 Maria BSHM First 12 2 Mario BSIT Second 2 Blocks Second 2 Second 2 1 Maria BSIT Second 1 2 Mario BSIT Second 2

Fig 2: Dashboard Page for Teachers

The image displays a Virtual Learning Environment's (VLE) Dashboard section with a particular emphasis on Courses and Blocks. Dashboard, Attendance, Report, Student, and Logout are among the options in the navigation panel on the left. The main content area shows two tables: the first one

lists students along with their enrolled courses, semester, block number, and course status (marked as "Complete"), along with action buttons for approval or deletion. Notification icons and the user profile named "Johnny S." are located at the top right.

➤ Attendance Sheet

KCK .								
Dashboard								
IALYZE	Stud	dents				Sea	irch	Ĩ
Attendance								
Report		Student's name	Туре	Email	Username	Password	Actio	on
ANAGE	3	Relioza, Rey Jan	Present	janjan@gmail.com	@janjan	*******	C	Ū
Student	z	Medida, John Reico	Present	johnM@gmail.com	@Rico1	*******	C	Ē
E Logout	3	Bangao, Zidney Janr	Present	Zidd@gmail.com	@zidnigs		C	圃
	4	Superio, Jericho	Present	jerjer@gmail.com	@jeqer69	*******	C	0
	65%	De Juan, Aleic	Present	Djalex@gmail.com	@alexD	*******	C	1
	÷	Bantilan, Diego	Present	diego1@gmail.com	@Diego2	********	C	圓
	277	Goding, Dodong	Present	Dodskie@gmail.com	@Dodskie1	******	ß	1

Fig 3: Attendance Sheet Page for Teachers

The image shown for attendance sheet of the teachers. At the left sidebar is shown the button for dashboard, attendance, report, student and the logout button. The main panels shown the students list such as number, student name, type, email, username, password and action also have a button for delete and edit.

➢ Report

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Fig 4: Report Page for Teachers

The image shown for report UI for teachers. At top navigation show for the profile of the teacher, notification and the messages. At the left sidebar is shown the button for dashboard, attendance, report, student and the logout button. The main panel shown the number of students present, absent, attendance, recent activities, attendance report and report that have graph for the students' activities.

Students Ui Login Page

Login Page
Virtual Username Description Description A Virtual Learning Environment (VLE) is an online Username Solito for course management, communication, collaboration, and assessment. It enables students appropries, and engage in learning activities remotely: Examples include Moodle, Blackboard, and Google Classroom. Solito Negister Nere

Fig 5: Login Page for Student

The image shown for Login Page for students. The Virtual Learning Environment (VLE) login page is an online platform that educational institutions use to facilitate digital

learning. The right-side container shown for the student's log in that have username text field, password text field and the sign in button.

> Dashboard

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The image shown for the student's dashboard. The top navigation shown student profile, name and the notification icon. At the left sidebar shown dashboard button, class list profile and the logout button. The top main panel show my class list and the search text field for searching or joining a new class. The main panel show the subjects that already enrolled and have button to enter the class.

> Student Profile



Fig 7: Student Profile Page for Student

The image shown for student profile page for student. At top container shown student profile, student ID, student name and also have activities, assignment and missed activities. At the bottom left shown a four button that is home, change password, change and logout button. The main panel shown your whole activity graph reports in a month or in a semester.

➤ Class 1

ISSN No:-2456-2165

VLES	Search					
	IT 412	Capstone Pro	oject			
Class 1	and R Subject	esearch 2 / Class 1				
Class 2						
Class 3	Subj	ects				
Class 4	*	Title	Date/Time	Deadline	Туре	Status
	1	Super Book	1/5/2024 - 11:30 Pm	1/10/2024	Files	In Progress
Homo	2	Attendance System	4/10/2030 5:00 Pm	04/20/2030	URL	Done

Fig 8: Class1 or Subject Page for Student

The image shown for class 1 in a student's page. At top navigation shown a search bar for the classes. The left sidebar has a subject list and class1, 2, 3, 4 button to navigate into

another page for classes also have a home button that connect into dashboard. The main panel shown a title of a subject and have a subject, date/time, deadline, type and status button.

➤ Class 2

VLE's	Search					
다 SUBJECTS 다 Class 1 다 Class 2 다 Class 3	IT 423 Admir Maint Subject	System histration & enance / Class 2				
Class 4	Subj	ects				
		Title	Date/Time	Deadline	Туре	Status
Home	1	Super Book	1/5/2024 - 11:30 Pm	1/10/2024	Files	In Progress
	2	Attendance System	4/10/2030 5:00 Pm	04/20/2030	URL	Done

Fig 9: Class 2 or Subject Page for Student

The image shown for class 2 in a student's page. At top navigation shown a search bar for the classes. The left sidebar has a subject list and class1, 2,3, 4 button to navigate into

another page for classes also have a home button that connect into dashboard. The main panel shown a title of a subject and have a subject, date/time, deadline, type and status button.

ISSN No:-2456-2165

Class 3

SUBJECTS						
Class 1	IT Elec Comp	: 4 Human uter & Intera	ction 2			
Class 2	Subject	/ Class 3				
Class 3	Sub	ects				
Class 4	*	Title	Date/Time	Deadline	Туре	Status
Home	010	Super Book	1/5/2024 - 11:30 Pm	1/10/2024	Files	In Progress
100 C	2	Attendance System	4/10/2030 5:00 Pm	04/20/2030	URL	Done

Fig 10: Class 3 or Subject Page for Student

The image shown for class 3 in a student's page. At top navigation shown a search bar for the classes. The left sidebar has a subject list and class1, 2, 3, 4 button to navigate into

another page for classes also have a home button that connect into dashboard. The main panel shown a title of a subject and have a subject, date/time, deadline, type and status button.

Class 4

Class 4						
VLE's	Search					
Class 1	IT Elec Systen and Ar Subject	5 n Integration rchitecture 2 / Class 4				
Class 2	- Cuthi					
Class 3	subje	Title	Date/Time	Deadline	Туре	Status
Class 4	1	Super Book	1/5/2024 - 11:30 Pm	1/10/2024	Files	In Progress
Home	2	Attendance System	4/10/2030 5:00 Pm	04/20/2030	URL	Done

Fig 11: Class 4 or Subject Page for Student

The image shown for class 4 in a student's page. At top navigation shown a search bar for the classes. The left sidebar has a subject list and class1, 2, 3, 4 button to navigate into

another page for classes also have a home button that connect into dashboard. The main panel shown a title of a subject and have a subject, date/time, deadline, type and status button.

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V. EVALUATION AND RESULTS

This study presents into detail on how data the data are gathered, presented and analyzed. In particular, this chapter present the effective of virtual learning environment for BSIT students and instructors: addressing usability, accessibility, and technological barriers in online IT education.

A. Usability Testing

The usability testing involved educational experience for BSIT participants. Year 1 to 4 (total of 100 participants) the Virtual Learning Environment (VLE) accessing and submitting assignments, participating in discussion forums, attending virtual classes, and navigating the course dashboard.

The study was conducted through structured questionnaires, where the participants rated their experiences using a Likert scale (1 - Strongly Disagree to 4 - Strongly Agree). The survey aimed to identify system strengths and weaknesses and explore opportunities for improvement. VLEs are generally user-friendly for both groups, but improvements are needed in interface simplicity and platform navigation, especially for firsttime users. Feedback was gathered through observation and post-test surveys. Most users rated the system as intuitive and easy to use. Key issues noted included difficulty in locating certain functions and occasional lag during high usage periods.

VLE is regarded as technology which is either accepted or rejected by its users such as students, and administrators. Perceived usefulness and ease of use play an important role in user acceptance and satisfaction. This paper provides quantitative results of usability evaluations i.e., the System Usability Scale (SUS) scores from different user groups including students. VLE evaluation comprised the utilization of an approach called Interactive Management (IM). The results showed that the newly implemented VLE performed under the average usability expectation. Students on average evaluated the usability of the VLE higher than the staff. The usability scores of the students from different courses showed remarkable differences. The ranked and categorized feedback from the IM session highlights the importance of planning, training and communication before and during the implementation, as well as the aspect of usability and learnability of the VLE (Attila Vertesi, Huseyin Dogan, Angelos Stefanidis, Giles Ashton and Wendy Drake, 2018).

B. Performance Metrics

Key performance indicators included task completion time, error rates, and satisfaction ratings. Average task completion time was under 2 minutes, with a low error rate (10%). The satisfaction rate, measured on a 5-point Likert scale, showed that 90% of users rated their experience as satisfactory or better. These metrics aligned with the study's objectives by focusing on user accessing and submitting assignments, participating in discussion forums, attending virtual classes, and navigating the course dashboard. Monitoring patterns in feedback helped align design improvements with the needs of user.

https://doi.org/10.38124/ijisrt/25may510

Virtual learning environments have had great relevance in the support and promotion of formal education, since it is informal education institutions that the educational guidelines and curricula of each country are implemented. However, within a perspective of change and innovation, VLEs may play a paramount role in supporting learning in non-formal and informal contexts. The concept of Innovation, which is used in current society, implies a need for change or renovation, or a need for doing something new (Paulo Alves, Luísa Miranda, and Carlos Morais, 2017).

C. Comparative Analysis

When compared to traditional learning platforms previously used by respondents, the new VLE showed improved accessibility and user engagement. 90% of users reported a better experience, while 10% indicated challenges with internet access and initial platform adaptation.

- Enhanced Engagement offer flexibility and convenience, several usability, accessibility, and technological limitations can create barriers that hinder student engagement and academic success learning barriers" (44.5% strongly agreed).
- User-Friendliness A total of 80% of participants agreed or strongly agreed on user-friendliness. Seeks to improve the quality of virtual learning experiences, making them more accessible, user-friendly, and conducive to achieving academic success.

Some users in lower year levels showed unsatisfaction with features such as "Personalized features" and "Built-in help/support." This highlighted potential usability barriers for less experienced users

VI. RESULTS AND FINDINGS

This section shows the results of the study on how effective virtual learning environments (VLEs) are for BSIT students and instructors, especially in terms of usability, accessibility, and technology problems.

Table 1:	Usability	of Virtual	Learning	Environment

Questions	Mean	Descriptive Rating				
The VLE is easy to navigate.	4.56	Strongly Agree				
The interface is user-friendly and intuitive.	4.44	Strongly Agree				
I can find course materials and assignments without difficulty.	4.23	Strongly Agree				
The platform's design helps me focus and engage with the lessons.	4.20	Agree				
Can easily interact with other users (e.g., classmates, instructors) through the VLE.	4.20	Agree				
Over Mean	4.33	Strongly Agree				

ISSN No:-2456-2165

https://doi.org/10.38124/ijisrt/25may510

Legend: 5.00-4.21 Strongly Agree, 4.20-3.41 Agree, 3.40-2.61 Neutral, 2.60-1.81 Disagree, 1.80-2.60 Strongly Disagree The survey measured user attitudes towards a Virtual Learning Environment (VLE) through five questions on navigation, interface design, access to materials, platform design, and interaction. The highest mean score was for "The VLE is easy to navigate" at 4. 56, indicating strong user agreement. The interface design received a score of 4. 44,

showing it is user-friendly. Users also agreed (4. 23) that finding course materials is easy. Two statements scored 4. 20 each, reflecting positive views on platform design and interaction. The overall mean score was 4. 33, indicating a generally positive user experience with the VLE.

Question	Mean	Descriptive Rating
I can access the VLE using my preferred device (e.g., phone, laptop)	4.30	Strongly Agree
The platform is accessible even on slow internet connections.	4.20	Agree
Features like subtitles, audio content, and screen reader compatibility are	3.40	Neutral
available and helpful.		
I can access the VLE using my preferred device (e.g., phone, laptop)	4.30	Strongly Agree
I can access learning materials anytime, without restrictions.	4.21	Strongly Agree
Overall Mean	4.08	Agree
Lagand: 5.00.4.21 Strongly Agree 4.20.2.41 Agree 2.40.2.61 Neutrol	2 60 1 81 Disagrag	1.80.2.60 Strongly Disagras

Legend: 5.00-4.21 Strongly Agree, 4.20-3.41 Agree, 3.40-2.61 Neutral, 2.60-1.81 Disagree, 1.80-2.60 Strongly Disagree

The table displays user opinions on the Virtual Learning Environment (VLE). Users strongly agreed (mean of 4. 30) about accessing the VLE on their preferred devices. They also agreed (mean of 4. 21) on accessing resources anytime. Accessibility over slow internet connections received a

positive response (mean of 4. 20). However, features like subtitles, audio material, and screen reader support were rated lower with a neutral mean of 3. 40. The overall mean score is 4. 08, indicating general agreement on the VLE's accessibility.

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Question		Descriptive Rating
I frequently experience internet connectivity issues that affect my learning/teaching.	4.56	Strongly Agree
I have access to a reliable device for VLE use.	4.44	Strongly Agree
Technical problems (e.g., system crashes, login issues) happen often.	4.23	Strongly Agree
I know how to get help or support when I face VLE-related issues.	4.20	Agree
The lack of technical skills makes it hard for me to use the VLE effectively.	4.20	Agree
Overall Mean	4.33	Strongly Agree

Legend: 5.00-4.21 Strongly Agree, 4.20-3.41 Agree, 3.40-2.61 Neutral, 2.60-1.81 Disagree, 1.80-2.60 Strongly Disagree

Table 3, the average mean score of 4.33 is that of the descriptive level "Strongly Agree," reflecting that technological issues are a major problem in the utilization of the Virtual Learning Environment (VLE). The majority of the respondents strongly believed that internet connection problems often hinder their learning or teaching experience (Mean = 4.56), and they have access to a stable device for VLE utilization (Mean = 4.44). Additionally, technical issues like system crashes and login problems were reported to be common (Mean = 4.23). The respondents were in agreement that they know what to do in case of help or support when

experiencing VLE problems (Mean = 4.20) and recognized that a lack of technical competence can hamper effective utilization of the VLE (Mean = 4.20).

These results point to the existence of facilitating and inhibiting technological factors in the VLE experience. With stable devices and support systems available, recurring technical and connectivity problems, and differing levels of digital literacy, point to the necessity of constant technical support, system adjustments, and training to facilitate equitable and effective use of virtual platforms for learning.

Questions		Descriptive Rating				
Using the VLE has improved my learning/teaching experience.	4.21	Strongly Agree				
I feel more confident using the VLE now that when i first started.	4.21	Strongly Agree				
I prefer VLEs over traditional face-toface learning.	3.36	Neutral				
Suggestions for improving your VLE experience.	3.45	Agree				
The VLE is easy to navigate and user-friendly.	4,30	Strongly Agree				
Overall Mean	3.91	Agree				

Table 4: Overall Effectiveness Virtual Learning Environmental

Legend: 5.00-4.21 Strongly Agree, 4.20-3.41 Agree, 3.40-2.61 Neutral, 2.60-1.81 Disagree, 1.80-2.60

Strongly Disagree the data provided in Table 4, the overall mean score of 3.91 is below the descriptive rating of "Agree," which means that most of the respondents perceive the Virtual Learning Environment (VLE) as effective for their

teaching or learning experience. In particular, participants agreed strongly that utilization of the VLE enhanced their learning/teaching experience (Mean = 4.21), enhanced their confidence in the long term (Mean = 4.21), and that the

ISSN No:-2456-2165

system is easy to use and friendly (Mean = 4.30). Nevertheless, a neutral response was recorded in preference of VLEs against face-to-face learning (Mean = 3.36), which means that some instructors or students still prefer or miss face-to-face contact. The item for suggestions for improvement had a mean score of 3.45, interpreted as "Agree," meaning that although the VLE is generally effective, there is still some room for improvement in content delivery, technical support, or interactive features.

These findings validate the positive attitude towards the usability of the VLE and its influence, and highlight the significance of aligning with user feedback to further enhance the online learning experience.

Based on the data collected from 100 respondents (95 BSIT students and 5 instructors), 90% expressed satisfaction and effectiveness in using Virtual Learning Environments (VLEs), while 10% reported challenges that hindered their learning or teaching experiences.

> The Findings are Summarized Below:

- Usability: The majority of users reported that the interface of their VLEs was generally intuitive and easy to navigate. However, 10% cited difficulties such as complicated menus and inconsistent layouts that made tasks more time-consuming.
- Accessibility: Respondents from remote areas highlighted connectivity and device-related issues. Instructors mentioned that some students had limited access to stable internet and compatible hardware.
- Technological Barriers: Common concerns included frequent platform lags, delayed updates, and technical glitches during live sessions or submission deadlines.
- Satisfaction with Content: 90% were satisfied with the quality and relevance of materials, appreciating the self-paced learning options. However, others felt some learning content lacked interactivity or was outdated.
- Instructor vs Student Feedback: Instructors appreciated VLEs for streamlining grading and content distribution, while students emphasized the importance of active engagement and timely feedback.

Overall, the data indicates that while VLEs are largely effective, there is room for improvement, especially in usability design and infrastructure support.

VII. DISCUSSION

A. Interpretation of Findings

The results show that the Virtual Learning Environment (VLE) helped improve the learning experience for both BSIT students and instructors by tackling common issues like usability, accessibility, and tech-related challenges.

Most of the BSIT students particularly from the First year has chosen Google Classroom as their primary

VLE platform and gives high ratings from (4-agree to 5Strongly Agree) when it comes into user friendliness of the user interface. But the researchers observed that most of the respondents gives high markings in having weak internet connection, which means that having internet connection issues affects students in using their VLE platforms which affects their learning.

https://doi.org/10.38124/ijisrt/25may510

The researchers also observed that some respondents from the lower years need more help when starting up using the VLE platforms, this suggest that a better support and attention could make more effective for new users of the platform.

B. Contributions and Innovation

This research highlights of how effective Virtual Learning Environments (VLEs) can be in supporting both BSIT students and instructors, particularly when making online IT education more usable, accessible, and inclusive for students and also the instructors. By focusing on user needs both in learning and teaching, this research shows how the design can remove the common barriers and make online education more effective for everyone.

Features like an intuitive interface and Interactive UIs proved especially helpful in keeping students engaged while also making the VLE platform easier to use. These feature shows a practical way of designing educational tools that are not only functional but also entertaining. Overall, this study helps the Students and Instructors about how we can make online learning systems work better for different types of people, particularly in programs that mainly focused on IT.

C. Limitations and Future Work

Although the findings are useful, there are a few things that shouldn't be missed. This research was only conducted to 100 students and selected instructors from South East Asian Institute of Technology Inc (SEAIT)., the results of this research do not apply on other institutions. And the system was only tested for a short period, the researchers might also have missed any challenges that come up with long-term use.

Future researches like ours should include students and instructors from different schools, universities, and other institutions to see how the VLE performs with this feature. It would also be beneficial for the researchers to follow users over a longer time, as this can help to understand how effectiveness it can be.

VIII. CONCLUSION

A. Summary of Key Findings

This research explores the effectiveness of the Virtual Learning Environments (VLEs) Platforms for BSIT students and instructors in South East Asian Institute Technology Inc., specifically evaluating usability, accessibility, and technological barriers. Among the 100 Respondents from BSIT Students, 90% has given high ratings when it comes to user experiences and user friendliness of the VLE platforms, particularly in the easy to navigate and improve learning/teaching experience. But, 10% has given low

ISSN No:-2456-2165

markings related to poor user interface design, Internet connection issues and some students has limited access to appropriate devices to use the VLE platforms.

The Research shows that while VLE platforms offer valuable educational opportunities for the BSIT students and instructors, most of their full potential is limited by some issues in design and infrastructure. Addressing these concerns is important for improving the user experience and ensuring more equitable and effective online IT education.

B. Final Remarks

Human-Computer Interaction principles play an important role in the development and evaluation of VLE platforms. Improving the usability and accessibility of these platforms can significantly improve educational outcomes for both BSIT students and instructors. Continually improving of VLE platform design and training for Instructors and students will contribute to a more broad and effective virtual learning experience.

RECOMMENDATIONS

- ➢ Based on the findings of this study, the following recommendations are proposed:
- User-Centered Design Improvements: Developers of VLE platforms should adopt HumanComputer Interaction (HCI) best practices to improve usability, including consistent layouts, streamlined navigation, and accessible features for users with varying levels of tech proficiency.
- Infrastructure Support: Educational institutions should invest in improving internet access and device availability for both students and faculty, particularly in underserved or rural areas.
- Interactive and Updated Learning Materials: Educators should be encouraged and supported in creating more interactive, up-to-date digital content that aligns with current IT industry trends.
- Technical Support and Training: Provide regular training for instructors and students on using VLE tools effectively. Establish responsive technical support channels for resolving issues promptly.
- Continuous Feedback Mechanism: Implement routine usability testing and satisfaction surveys to identify platform limitations and make timely improvements based on actual user experiences.

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ISSN No:-2456-2165

https://doi.org/10.38124/ijisrt/25may510

APPENDICES PURPOSE

This questionnaire aims to gather data on the usability, accessibility, and technological challenges of Virtual Learning Environments (VLEs) used in IT education. **Instructions:** Please answer the questions honestly. Your responses will be kept confidential and used solely for academic research.

A. Section A: Demographic Information

➢ Name (Optio	onal):		
> Age:			
Below 20		20-25	
26-30		31 and above	
> Role			
2 nd Year		Student	
4 th Year		Instructor	
➢ Year Level (i)	f Student):		
1 st Year 3 rd Year			

➤ What VLE Platform do you Primarily Use?

:_

_____ (e.g., Google Classroom, Moodle, MS Teams)

B. Section B: Usability of the VLE 1-Strongly Disagree 2-Disagree 3Neutral 4-Agree 5Strongly Agree

	1	2	3	4	5
6. The VLE is easy to navigate.					
7. The interface is userfriendly and intuitive.					
8. I can find course materials and assignments without difficulty.					
9. The platform's design helps me focus and engage with the lessons.					

C. Section C: Accessibility of the VLE

	1	2	3	4	5
10. I can access the VLE using my preferred device (e.g., <i>phone</i> , <i>laptop</i>)					
11. The platform is accessible even on slow internet connections.					
12. Features like subtitles, audio content, and screen reader					
compatibility are available and helpful.					

D. Section D: Technological Barriers of the VLE

	1	2	3	4	5
13. I frequently experience internet connectivity issues that affect my					
learning/teaching.					
14. I have access to a reliable device for VLE use.					
15. Technical problems (e.g., system crashes, login issues) happen often.					
16. I know how to get help or support when I face VLE-related issues.					

ISSN No:-2456-2165

https://doi.org/10.38124/ijisrt/25may510

E. Section E: Overall Effectiveness of the VLE

	1	2	3	4	5
17. Using the VLE has improved my learning/teaching experience.					
18. I feel more confident using the VLE now than when I first started.					
19. I prefer VLEs over traditional face-to-face learning.					

20. Suggestions/Recommendations/Comments for improving your VLE experience.