User Interface and Experience Optimization: An Evaluation of Design Enhancements for the Virtual Learning Environment (VLE)

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Abstract: This study investigates the Development of User interface (UI) and user experience (UX) design in a Virtual Learning Environment (VLE) to Enhance student's engagement, usability and overall satisfaction. With digital E-learning platforms increasingly taking Center stage in learning environments, the research aims to resolve problems that are related to complexity in navigation, inefficient visual design and limited user interaction. Using a quantitative research approach, data was gathered from 100 BSIT students at the South East Asian Institute of Technology, Inc. through surveys and usability tests. The redesigned VLE was evaluated using key performance indicators, including the System Usability Scale (SUS), task completion rate, error rate, and average task time. The result showed high improvements in usability, as represented by a System Usability Scale (SUS) score of 82.5, coupled with accuracy at 84.0 and acceptability at 83.1. The rate of Completion also reached 95% with 5% as the error rate. These outcomes Highlight the importance of Human-Computer Interaction (HCI) principles in E-Learning systems demonstrating how Optimized designs improvement can significantly improve learning experiences. This paper advances the HCI research area by demonstrating faactual evidence concerning the usability of enhanced User Interface (UI) and User Experience (UX) design in virtual learning environments as well as providing practical implications for developers and educators seeking to maximize digital learning systems.

Keywords: User Interface, User Experience, Virtual Learning Environment, Usability, Engagement, Satisfaction.

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I. INTRODUCTION

A. Background and Context

Virtual Learning Environments (VLE) in education have been becoming a more and more essential part of the education process in recent years. E-learning refers to all forms of electronically supported learning and teaching, and there are many virtual learning systems become popular because people now realize how flexible and convenient online learning can be. Although these systems have become widely common, there are still a number of VLEs with poor UI and UX, resulting in low learner engagement, motivation, and effectiveness of learning.

Human-Computer Interaction (HCI) technology is significant because it enhances the usability and satisfaction of digital systems, making them more intuitive and userfriendly. As technology evolves, effective HCI design improves user engagement, satisfaction, and productivity across various domains, from education to healthcare (Shneiderman et al., 2016). The efficacy of an e-learning system is significantly contingent upon the quality of its user interface design and its level of user-friendliness, particularly with regards to student users. An optimally designed user interface guarantees that students can effortlessly traverse the platform, get course materials, engage with instructors, and communicate with peers. Additionally, the study emphasized the significance of performing usability assessments in order to collect user input (Jehad Saad Alqurni, 2023).

This research aims to look at how virtual learning environment (VLE) is currently designed and suggest ways to make it better, focusing on how it looks and how easy it is to use. It wants to find out what parts of the user experience are frustrating, how user-friendly and visually appealing the interface is, and how any suggested design changes could improve the overall experience. By focusing on better design, the study hopes to help improve online learning platforms and support better learning results. Volume 10, Issue 5, May – 2025

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B. Research Problem

In spite of the extensive usage of Virtual Learning Environments (VLEs), most of the users are still troubled with messy interfaces, bad navigation, and minimal intuitive interaction. These problems affect user engagement, learning effectiveness, and overall satisfaction in a negative way. VLEs bring flexibility and accessibility, but most of the potential is lost because of poor user interface (UI) and user experience (UX) design. Using HCI principles in Virtual Learning Environments (VLEs) can increase UI/UX, better learning outcomes, user retention, and more inclusive education in this digital age.

C. Research Questions

- How does the application of UI/UX design principles influence the overall enhancement of a Virtual Learning Environment (VLE)?
- What design enhancements can be implemented to improve user experience and increase learner engagement within a VLE?
- ➤ What specific issues are currently affecting users' interactions with the VLE, and how can they be addressed through UI/UX optimization?

D. Objectives

- To evaluate the efficiency of integrating modern UI/UX principles in VLE's interface by gathering user feedback.
- > To identify and analyze potential design enhancements that can improve the usability, accessibility, and engagement of the VLE interface, thereby increasing overall user satisfaction.
- To highlight and understand the specific usability challenges users face, providing a basis for improvements that can enhance the overall functionality and user experience of the system.

E. Justification and Significance

The relevance of this research lies in the increasing reliance on digital platforms for education, particularly in light of recent trends towards remote and hybrid learning. With more learners utilizing virtual learning systems, the need for intuitive and user-friendly interfaces becomes paramount. Effective UX design can lead to improved learner satisfaction, ultimately driving better educational outcomes. By evaluating design enhancements, this research can provide valuable insights for educators, instructional designers, and educational technology developers on how to create more accessible and engaging learning environments (Danny Stefanic. (2024). The assessment of design improvements in virtual learning environments is not only about aesthetic enhancement; it is crucial for creating effective learning experiences that are responsive and inclusive for everyone.

II. LITERATURE REVIEW

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A. Overview of HCI Theories and Models

Norman's Interaction Model - This model has played a pivotal role in enhancing the user interface (UI) and user experience (UX) of Virtual Learning Environments (VLEs), reflecting significant evolution over time. As the demands of educational technologies have changed, the model has evolved to better suit VLE applications, fostering improvements in usability and user-centered design (Nasir Uddin, 2025). The relevance of Norman's Interaction Model to UI/UX optimization in VLEs is evidenced by its incorporation into design principles that prioritize user needs and goals. Key principles derived from the model include affordances, signifiers, and the importance of feedback, which have become essential in crafting intuitive and effective learning interfaces (Ian Batterbee, 2020).

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

Online Class UI/UX Design Using Design Thinking Method in Virtual Reality Environment

The development of Virtual Reality (VR) technology opens up new opportunities to improve the quality of online learning through more interactive and immersive learning experiences. This study aims to design the user interface (UI) and user experience (UX) of VR-based online classes using the Design Thinking method to meet students' needs in a virtual learning environment. The Design Thinking method, which includes the stages of empathy, definition, ideation, prototype, and testing, is applied to produce a user-friendly interface design that supports student engagement and social interaction during the learning process. The results of the study show that the VR-based interface is able to increase student engagement through more active interactions, intuitive navigation, and collaboration features that approach interactions in a physical classroom. Testing of the prototype shows that this design can meet students' needs in increasing engagement and learning comfort. It is hoped that this study can be a reference in the development of an effective and efficient VR-based online learning platform.

> UI/UX Design for Online Learning Approach by Predictive Student Experience

This study examines how an User Interface (UI) and User Experience (UX) design for online learning/educational platforms can be designed in a way that can be fully effective for achieving educational outcomes. In order to find out the importance of UI/UX design, a quick survey was conducted using Google Form about user experience in terms of UI of tools and websites, audio, video clarity, screen sharing, messaging chat, number of maximum participants, network adaptability, course, name, age, cost and demographic location. In this survey, 560 students participated from across the discipline. Out of 560 participants only 530 respondents, out of 530, 359(67.9%) were male and 171(32.1%) respondents are female. 470 (88.7%) respondents feel that UI design is vital for a tool or website while 401 (75.6%) respondents had bad experience of UI, 106 (26.4%) students continue with website even it has bad UX and 295 (73.6%) students leave the website. 350 (66.6%) respondents prefer to

ease of use, 53 (10%) respondents prefer mobile accessibility, 111 (21%) students prefer technical support and 148 (28%) respondents prefer cost more than UI design of e-learning platforms. The survey shows that most of the respondents are male and mean (SD) age 21 years. Zoom app and Udemy are their most preferred tool and online learning platform respectively. In this study, a number of user studies are given that may be used to evaluate UI and UX and examine usability as well as utility. Additionally, applying ML techniques on curated datasets to find best UI design of tool and website for online platform.

➤ Usability Evaluation of E-Learning Platforms Using UX/UI Design and ML Technique

This paper investigates the User Interface (UI) and User Experience design of (UX) various online learning/educational platforms to improve student's satisfaction. In order to find out the importance of UI/UX design, an empirical web based survey was conducted about user experience in terms of UI design of websites including audio, video clarity, screen sharing, messaging chat, number of maximum participants, network adaptability, course, name, age, cost and demographic location. Udemy is their most preferred online learning platforms followed by Coursera. In this study, we give a number of user studies that may be used to evaluate UI and UX and examine usability as well as utility. Additionally, applying ML techniques on curated dataset to recommend best UI design of websites for learners. The experimental result depicts XGB outperforms better than other classifiers for Udemy. The investigation emphasizes the critical role of User Interface (UI) and User Experience (UX) design in improving students' satisfaction with e-learning platforms. Empirical surveys conducted revealed that aspects such as audio and video clarity, ease of navigation, and interactive features substantially influence users' experiences. This suggests that a well-designed UI/UX can lead to higher engagement and foster more effective learning environments.

The study concludes with strong recommendations for continuous improvements in e-learning platforms by incorporating both user studies and machine learning insights into the design process. It advocates for iterative testing and user feedback loops to identify specific aspects of the UI/UX that require enhancements, ensuring the platform remains user-centric and aligned with educational standards. This approach not only increases user satisfaction but also leads to better learning outcomes as the platforms adapt to various user needs.

Principles and Practices for Enhanced Visual Design in Virtual Learning Environments: Do Looks Matter in Student Engagement

The widespread adoption of learning management systems (LMS) in higher education has been promoted as a means of modernizing learning material, improving learning outcomes, and enhancing student engagement, but has often fallen short of these goals. It has been suggested that investment in visual design has the potential to ensure the promise of LMS can be realized. Through the reflections of instructors, a learning designer, and students, this chapter explores the relationship between LMS aesthetics and usability and student engagement. It proposes visual design principles and practices which highlight the combined contribution of functional utility, visual identity, aesthetic appeal, and transactional access to enhancing student engagement and user experience in a virtual learning environment.

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Online learning management systems (LMS) play an important role in providing the infrastructure necessary to support the delivery of learning content and resources and are an important complement to traditional face-to-face classroom teaching approaches (Hustad & Arntzen, 2013; Torrisi-Steele & Drew, 2013). Indeed, the very ubiquity of LMS use in higher education contexts has seen them labeled "an omnipresent educational technology juggernaut" (Murphy, 2012, p. 827). However, although it was predicted that the increased adoption and use of LMS would deliver increased flexibility and new efficiencies, open opportunities for participation in higher education, enrich student learning experiences, and enhance interdisciplinary learning (Alhazmi & Rahman, 2012; Coates, James, & Baldwin, 2005; Park & Mills, 2014), many of these benefits are yet to be realized.

Exploring the Role of Interaction in Engagement and Satisfaction Within Virtual Learning Environments

Empirical studies have recognized the significant role of student engagement and interactionin determining satisfaction within high-quality, synchronous virtual learning environments. A prevailing concept in research surrounding synchronous virtual satisfaction suggests that interaction is a key driver of learner engagement. However, very few research has delved into the underpinnings of this relationship. This study, therefore, aims to examine the potential mechanisms that link student engagement and satisfaction through interactions within a synchronous virtual learning environment. A sample of 200 South Korean secondary school students, comprising a balanced gender ratio (51% male, 49% female), was included in this research. The findings demonstrate a series of positive correlations among student engagement, interaction, and satisfaction. Furthermore, mediation analysis revealed a positive relationship between student engagement and satisfaction, with interaction serving as a mediating variable. The study's results suggest that high school students derive benefits when teachers take active steps to engage them. The findings of this study could guide future planners of synchronous virtual learning environments to prioritize student engagement as a strategic initiative for boosting satisfaction levels.

Enhancing user experience in online learning environments: Design, evaluation, and usability techniques

This study aims to enhance user experience on online learning platforms by investigating design principles, usability evaluation techniques, and redesign processes. A total of 150 participants, divided equally among students, educators, and professionals, were stratified by age, gender, education level, and familiarity with online learning. Various evaluation methods, including heuristic evaluation, guideline reviews, and cognitive walkthroughs, were employed. Volume 10, Issue 5, May – 2025

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Metrics such as task success rate, time-on-task, and Net Promoter Score (NPS) were used to quantify user satisfaction and effectiveness. Additionally, five qualitative interviews were conducted for deeper insights. The results revealed specific usability issues and demonstrated the effectiveness of the applied evaluation techniques. Post-redesign metrics indicated significant improvements in user satisfaction and engagement. The study underscores the importance of a multi-faceted approach to design and evaluation in online learning platforms and suggests avenues for future research.

Using a Survey and Discussion Forums on Students' Satisfaction and Experience to Inform the Development of a New Virtual Leaning Environment (VLE): A Data-Driven Approach to Technology Use in Learning and Teaching

The virtual learning environment (VLE) is of great importance in Higher Education as a repository for course content, communication and student support. Students' satisfaction with the VLE may impact greatly on their engagement with the VLE itself, and, consequently, module content and learning more widely. In moving to a new VLE we wished to optimise its design for our students' needs by determining features that impact students' usage. As such, in this study we tested the satisfaction of psychology students with the layout used in our current VLE, Blackboard Learn (BbL). Using an online survey, students rated their satisfaction for each element of the BbL template on a 7-point Likert-type scale, from 1 ("extremely dissatisfied") to 7 ("extremely satisfied"). Eighty-seven students enrolled in the BSc Psychology (N = 68) and BSc Psychology (Sport, Health and Exercise) (N = 19) programmes completed the survey. Results showed that, overall, students were very satisfied with their BbL structure. Open-text comments indicated students appreciated the clear, organised structure, making it very easy to navigate. However, students suggested clearer labelling and greater consistency across modules would improve their learning. These findings will be used to inform the template of our new VLE.

C. Analyze Existing Solutions Related to the Research Problem

Various strategies have been employed to improve the UI and UX in VLEs, aiming to create engaging and effective learning environments. Intuitive Navigation: Many VLEs are designed to facilitate straightforward navigation and user-friendly interfaces to support diverse learner demographics,

helping users engage with the content without frustration (Jeremy Lovelace, 2021). Despite these advancements, several limitations hinder the full realization of effective UI and UX in VLEs:

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Inadequate User Familiarity with Design: Users often face difficulties navigating VLEs due to a lack of familiarity with the specific design cues employed. This can lead to cognitive overload as students grapple with understanding navigation rather than focusing on learning objectives (Connie Malamed, 2018).Complexity and Clutter: VLEs sometimes suffer from overly complex designs that are not user-friendly. This can result in learners feeling overwhelmed, which ultimately impacts their engagement and retention of material. Critical gaps also exist within the strategies currently deployed in VLEs, indicating areas for further improvement: Lack of Personalized Learning Paths: Many existing VLEs do not offer individualized learning experiences tailored to the unique needs and preferences of learners. Personalization is crucial for engagement and can significantly improve learning outcomes (Jennifer Lindsay-Finan, 2024).Inconsistent Application of Accessibility Standards: While efforts have been made to improve accessibility, inconsistencies remain in applying standards across different platforms. This leads to barriers for learners with impairments, further highlighting the need for accountability in design practices (captioningstar.com, 2024)

III. METHODOLOGY

A. Research Design

This research study will be conducted using a quantitative research method a descriptive research design has been employed in our study for User Interface and Experience Optimization and Evaluation of Design for the Virtual Learning Environment (VLE), Quantitative research methods broadly include questionnaires, structured observations, and experiments.

B. Respondent

The respindents for this study included a total of 100 individuals, The target participants for this study are the BSIT student at SEAIT who actively use the VLE in at Southeast Asian Institute of Technology Inc. (SEAIT). Quantitative method is a research approach that emphasizes using numerical measurements and <u>statistical analysis</u> to understand phenomena.





C. Data Collection

The study used a quantitative exploration approach that centered around the Evaluation of Design Enhancements for the Virtual Learning Environment (VLE) within the SEAIT. It will employ a survey questionnaire (Quota Sampling) via google form as the research instrument to collect the quantitative data from BSIT students on their experiences with user-centered design in the Virtual Learning Environments, thus carrying out a detailed examination of ease of use, satisfaction, and usability (Casumpang F., et al., 2024).

D. Data Analysis

The data was analyzed using qualitative research methods, focusing on statistical analysis to evaluate user interface (UI) and user experience (UX) improvements in the Virtual Learning Environment (VLE). Key metrics will include the accuracy rate, where Pearson's r will be used to measure the strength and direction of the correlation between recorded attendance data and the actual student presence. Time efficiency will be assessed through Pearson's r to determine the relationship between the time spent on attendance and the implementation of the applied enhancements. Furthermore, user feedback, received from surveys completed by students and instructors, will be examined using Pearson's r, so as to find out whether there is a relationship between system changes and customer satisfaction. This examination will be helpful in knowing whether the system improvements are correlated with performance outcomes that are significantly better in terms of accuracy, efficiency, and user experience.

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E. Ethical Considerations

The research for Enhancing User Experience Exploring the Virtual Reality and Mixed Reality for Virtual Learning Environments will 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. et al 2024).

IV. ADVANCED HCI SYSTEM DESIGN

A. System Architecture

The advanced HCI VLE architecture is designed to enhance usability, efficiency, and user satisfaction, built around a client-server model that integrates a user-friendly interface with backend data handling.

➤ Key components:

- User Interface (UI) layer: An accessible, user-friendly platform with intuitive navigation and a responsive design.
- Interactive Learning Modules The use of innovative modules such as a question test, a communication platform, and multimedia materials, serves to attract learners' attention in an active manner.
- User Feedback & Evaluation Module: Real-Time Surveys, Ratings, and Reports, Captures user perceptions of interface changes.
- Adaptive Learning Pathways The solution gives out individual performance and preferences dependent learning pathways



Fig 2 The diagram outlines of Virtual Learning Environment (VLE) with distinct modules for Manage Class, Notification, Manage Message, VL meet.

B. Features and Functionalities

Student Class Management

allows them to create, update, and organize classes while the students can simply join by using access codes or invitations. It also shows current schedules, announcements, and ongoing sessions as an effective way to provide clarity and structure.

> Notification

It keeps both students and educators informed in realtime about class activities, assignments, announcements, and changes in the schedule. The notifications and updates guarantee that none miss urgent information.

➤ Message

It facilitates the direct connection between students and educators within the platform. It is the place where private chats, group messages, and class-wide announcements are possible providing the ground of cooperation and fast doubt resolution.

➢ VLE Meet

This is a virtual meeting platform that integrates seamlessly and supports live classes, discussions, and presentations. The platform does not limit any functionality and enables the teacher to share the screen, track attendance of the learners, and interactive tools such as whiteboard and poll for the virtual learning experience to be memorable. https://doi.org/10.38124/ijisrt/25may146

> Portfolio

Each student can organize a combination of personal learning records where they can keep their submitted assignments, project work, feedback, and accomplishments. The record can help them monitor their academic performance for some time and give them space for selfassessment of learning.

➤ Archive Class

The teachers to keep old or inactive classes in the archive for future references without removing the information. The teachers can keep their work environment clean by using this functionality and, at the same time, get rid of past learning materials and records.

All these features contribute to solving the research problem by improving the overall teaching and learning process inside virtual space. The system allows for simplified navigation, centralized work, and real-time interaction, all of which are essential to addressing many of the common roadblocks associated with digital education. The VLE provides the best of both worlds by replicating theoretical pedagogy while capitalising on the affordances provided by modern interfaces and digital tools - signalling a change in the nature of the virtual learning environment (VLE) toward a more meaningful and user-friendly platform for remote engagement. This is why the system being presented is addressing a larger need for modern technologyfocused educational solutions, not just in terms of functionality in use, but also in terms of its perceived attractiveness and utility to the user and their pedagogical objectives.

C. User Interface Design



Fig 3 The Login Interface of Virtual Learning Environment

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Virtual Learnin	ng Enviror	ment		🛔 ALOVERA JOE-AN
ALOVERA JOE-AN	٩N	My Class / School Year: 2024-2025 Second Set	195 Points	194 Points
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📽 My Class	0			
Notification	0			0 Enroled Class
🛥 Message	0	JOIN		
O VLE Meet	0		_	
Portfolio	0	 Nocios contenti/inoristical to eny classical 	8	
Archived Class	0			

Fig 4 The Manage Class Show all the enrolled subject where the students can Enrolled the subject



Fig 5 The Manage Notification Show all Activities Assignments and Deadline where the teacher posted e activities and assignment with deadline

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		Message	e / Inbox / School Year: 2024-20	25 Second Semester	A Country Manager	
					/ Create Message	
		⊠ Ini	box Sent	Ger Read Check All	For Teacher For Studen	it
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Fig 6The Manage Message Show all the message coming from teaches and the student can send a message for the teacher



Fig 7 In this figure the student can submit a file in portfolio

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Fig 8 In this figure the student can archived the subject or any file in the Virtual Learning Environment(VLE)

V. EVALUATION AND RESULTS

A. Usability Testing

To determine the effectiveness of the design enhancements implemented in the Virtual Learning Environment (VLE) of South East Asian Institute of Technology, Inc. a usability testing process was conducted among 100 student participants. Participants are selected to use the enhanced VLE for one week, during the time they performed various tasks such as accessing course material, uploading assignments, participating in discussion forums, and navigating around the new user interface. After the testing session volunteers were asked to complete a comprehensive System Usability Scale (SUS)-based questionnaire. The questionnaire focused on major categories like Functionality, User Interface Design, Navigation, Accuracy, and Overall User Experience. Honest and impartial answers were ensured by collecting data anonymously through an online Google Form.The answers were rated on a pre tested 5-point scale. Reverse scoring was applied to negatively worded statements in order to maintain consistency and improve the reliability of the usability evaluation. This served to more accurately measure the impacts of the recent design changes on the usability and user satisfaction of the VLE platform.

Performance Metrics Quantitative Metrics

To quantitatively assess the effectiveness of the user interface and experience enhancements made to the Virtual Learning Environment (VLE) of South East Asian Institute of Technology, Inc., a series of performance metrics were defined and measured. The evaluation involved 100 student participants who interacted with the upgraded VLE system over a one-week period.

Key performance indicators included **System Usability Scale (SUS) scores, error rate, task completion rate**, and **average time to complete a task**. These metrics provided a clear picture of the system's usability, efficiency, and user satisfaction.

System Usability Scale (SUS) Score

The SUS is a standardized instrument used to evaluate system usability. Each participant completed a 10-item questionnaire rated on a five-point Likert scale. Scores were adjusted according to the nature of each statement:

- For **positively worded items**: Adjusted Score = Response 1
- For negatively worded items: Adjusted Score = 5 Response
- The SUS score is then calculated as: SUS Score = (Sum of Adjusted Scores / Number of Respondents) × 2.5
- For this Evaluation, 100 Participants Completed the SUS Questionnaire. Below is a Breakdown of scores per Category:

Category	Total Adjusted Score	SUS Score Calculation	Result
Functionality	3300	$(3300 / 100) \times 2.5 = 33 \times 2.5$	82.5
Accuracy	3360	$(3360 / 100) \times 2.5 = 33.6 \times 2.5$	84.0
Acceptability	3324	$(3324 / 100) \times 2.5 = 33.24 \times 2.5$	83.1

Table 1 100 participants completed the SUS questionnaire

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> Task Completion Rate

This metric measures the percentage of tasks that users were able to complete successfully within the VLE platform, such as accessing modules, uploading assignments, and engaging in forum discussions.

- Task Completion Rate (%) = (Number of Successfully Completed Tasks / Total Tasks Attempted) × 100
- Total tasks attempted: 1000
- Total tasks completed successfully: 950
- Task Completion Rate = (950 / 1000) × 100 = 95% Error Rate

This represents the frequency of issues encountered by users, including navigation errors, submission failures, or unresponsive features.

Error Rate (%) = (Number of Errors / Total Tasks Attempted) × 100

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- Total errors recorded: 50
- Total tasks attempted: 1000
- Error Rate = (50 / 1000) × 100 = 5% Average Time to Complete Task

Efficiency was measured by how quickly users could perform common tasks on the platform.

- Average Task Time = Total Time Taken / Number of Tasks Completed
- Total time recorded for 950 completed tasks: 4750 seconds
- Average Task Time = $4750 / 950 \approx 5$ seconds

5	1 7 7 5
Metric	Value
SUS Score (Functionality)	82.5
SUS Score (Accuracy)	84.0
SUS Score (Acceptability)	83.1
Task Completion Rate	95%
Error Rate	5%
Avg. Task Time	5 seconds

Table 2 Summary Result of Task Completion, Error Rate, and SUS Scores Summary

B. Comparative Analysis

The new design enhances Virtual Learning Environment (VLE) at South East Asian Institute of Technology, Inc. quite significantly in terms of interactions from the students. Compared to the previous version, which students would often find it confusing, cluttered and hard to use, the new interface is like a breath of fresh air. The previous system tended to produce longer task times, user annoyance and a higher chance of error more frequently. In contrast, the new VLE is smoother and less laborious to use. Usability testing shows clear improvements in key areas like functionality, accuracy and overall experience. Functionality scored an 82.5, Accuracy 84.0, and Acceptability 83.1 on the System Usability Scale (SUS), a very strong indication that the changes were on track. The students have stated that the new layout is more intuitive and responsive, which extensively simplified learning courses, assignment submission, and finding learning content with undue inconvenience. Furthermore, the task success rate is a whopping 95% and an incredibly low 5% error rate, proving how much better and reliable the new system is. That's a dramatic increase from the previous one with confusing schematics and clunky processes often stalling the execution of tasks. Now, the time it takes to complete a typical task is only 5 seconds, with less bumpy navigation and improved organization. The revamped VLE also brought with it smart new features—like instant feedback for assignment uploads, easier access to learning materials, and a responsive interface that works on any device. These innovations did not just make things easier for students; they also simplified administrative loads and enhanced overall interaction with the system.

Table 3 Interpretation of	SUS Scores Summary,	Error Rate, Task	Completion,
1			1

Metric	Value	Interpretation
SUS Score	82.5	The students' satisfaction with the platform's real-time performance for academic
(Functionality)		assignments was not unexpected and the technology was easy to use for this purpose.
SUS Score	84.0	The statement reflects the great care in the implementation of the system e. g. in the case of
(Accuracy)		assignment submissions, quizzes. The students are satisfied with the system that the experts
		expect to be fault-free in their function.
SUS Score	83.1	Very good user acceptance. Users are willing to use and adopt the system.
(Acceptability)		

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Task Completion Rate	95%	Very high — The speed of the success in the process of performing a particular job was brilliant. The task was easy for almost all the students to complete and there were no significant complaints.
Error Rate	5%	Low — few mistakes occur while users interact with the system.
Average Task	5	Very fast — Having displayed such high ability, the system enabled the students to
Time	seconds	complete the assignments very quickly thereby enhancing the productivity levels further
		and considerably reducing the frustration that comes with working at a decreased

C. Results and Findings

The usability test results for the redesigned Virtual Learning Environment (VLE) at South East Asian Institute of Technology, Inc. Provided extremely positive result Based on the System Usability Scale (SUS) tests administered to 100 student participants, the following average scores were obtained:

- ▶ Functionality: 82.5
- ► Accuracy: 84.0
- ➢ General Acceptability: 83.1

These results emphatically demonstrate that the improved VLE interface was favorably accepted meeting essential benchmarks for usability, performance and general user satisfaction. The high SUS scores in every category demonstrates that the platform is not Only Functional and dependable but also easy to use and available for a large number of student users.

Aside from subjective usability scores, performance measures also established the efficacy of the interface improvements. with a task success rate of 95% an extremely Low error rate of only 5% and an average task Time of 5 seconds, the VLE was much more Efficient and easier to use than its previous version. users experienced Fewer challenges when retrieving content, posting assignments, or navigate course modules reflecting effective dismiss of most of the pain points that were initially experienced with the system.

VI. DISCUSSION

A. Interpretation of Findings

The findings of this study provide valuable insights into how the optimization of the User Interface (UI) and overall system functionality contributes to improved student engagement, learning outcomes, and satisfaction within the Virtual Learning Environment (VLE) at South East Asian Institute of Technology, Inc., Tupi, South Cotabato. With 100 participants interacting with the updated VLE, it became evident that both the UI enhancements and the system functionality were critical in fostering a more effective and enjoyable learning experience.

RQs #1: How does the application of UI/UX design principles influence the overall enhancement of a Virtual Learning Environment (VLE)?

Answer: The VLE benefited greatly from the implementation of UI/UX design principles. Results After a survey among 100 Respondents the results show a more

fluent system navigation and faster task completion. The new interface was easier to use and more reliable which made it easier for students to concentrate on their learning instead of being stopped by technical issues. Quality marks were high in all criteria suggesting that good design advances use of the system by the students. These enhancements leads to better engagement and a more supportive virtual learning platform.

RQs #2: What design enhancements can be implemented to improve user experience and increase learner engagement within a VLE?

Answer: The VLE was redesigned to be more userfriendly and interactive. Changes such as a more user-friendly interface, the capability of the users' device, a layout that fits well on the screen, and easy to locate menus and navigation labels; interactive design that can be used across different devices and technologies; as well as live chats, forums, or virtual interactive sessions as an add-on. Notifications, for instance, accessing students' personal portfolios, applying for their progress tracking, and accessibility such as proper utilization of visible colors and readable text are also alternatives. The above-mentioned improvements ease students' understanding of learning and teaching materials, reduce their hesitation to study on their own and make the learning process much more engaging and accommodating.

RQs #3: What specific issues are currently affecting users' interactions with the VLE, and how can they be addressed through UI/UX optimization?

Answer: Despite the significant improvement with the redesign, there were still some usability issues. Different students struggled to find relevant information, could not easily read small or poorly readable text, or struggled to find some things difficult to read based on color contrast. Some users genuinely had considerable challenges, especially as far as accessibility was concerned. Any subsequent UI/UX enhancements will now have to enhance visual comprehensibility, accessibility of major parameters, and readability of text to resolve these problems. This shift will enhance the user experience for all students.

B. Contributions and Innovation

This study makes a significant contribution in the field of Human-Computer Interaction (HCI) by showing how user focused design principles can be applied in a bid to enhance a complex education system as demonstrated by a Virtual Learning Environment (VLE). by focusing on the enhancement of the most Critical aspects of the user interface and experience, the research justifies that even relatively modest design improvements such as simple navigation, reduced task flows, faster response times and a clean layout can contribute significantly to user satisfaction and engagement. The in-built real-time features, including automatic attendance, assignment handing in and instant feedback, are an innovation of prime importance. They not only enhance precision but also minimize the administrative burden on teachers and enable students to use the system more efficiently. The VLE is thus now a smooth, easy experience with easy access to course materials and easy completion of tasks with minimal lag.In addition, the assessment and resulting design enhancement made actual user feedback demonstrate the value of Iterative development in Developing systems that are Not only functional but also genuinely useful to end Users. This research clearly shows how ongoing evaluation and user-oriented design can Result in the development of Learning platforms that satisfy the changing demands of learners and teachers alike.

C. Limitations and Future Work

While the outcomes of the study are promising, there are a few limitations to highlight. First, the test was conducted using a sample of 100 respondents from one institution, which limits the generalizability of the results. The findings and remarks are the South East Asian Institute of Technology, Inc. students' experiences but may not reflect the needs or issues of students, faculty, and staff from other schools or diverse educational environments. To better learn about the usability and efficacy of the system, future studies can involve a greater number of participants from different schools, disciplines, and backgrounds. Another limitation is the backbone of the system on a Stable internet connection to work properly. where there is Limited or no internet coverage, The functionality of the VLE may be risked. This can be addressed by introducing an Offline mode allowing data to be Saved locally and synchronized once connectivity is available. This would improve the accessibility and usability of the system in regions with limited or intermittent internet coverage. There are several areas for further development and exploration in the future. Until then, the system may be tested in other places of learning, including faculty and staff in the user group to achieve more diversified feedback and ensure that the VLE is suitable for everyone.

VII. CONCLUSION

A. Summary of Key Findings

The aim of this Research was to assess the efficacy of design improvements in the Virtual Learning Environment (VLE) at South East Asian Institute of Technology, Inc. Using a user-centered design process. The results showed Important system performance and user experience enhancements after the design changes. Participants, including 100 students,

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rated the system very high in accuracy, usability, and functionality based on the very high System Usability Scale (SUS) scores: 82.5 for Functionality, 84.0 for Accuracy, and 83.1 for General Acceptability. The ratings reflect the effectiveness of the system to meet user requirements, being simple to use and efficient in everyday usage. The new VLE registered meaningful Task completion rate (95%) and average task time (5 seconds) increases, Demonstrating its speed and reliability. The Low error rate of 5% also indicated the stability of the system and reduced the issues encountered in user interactions in earlier versions. The new interface enabled quicker access to learning materials, enhanced navigation, and more fluid interactions for students and faculty. These findings highlight the importance of integrating user feedback into the design process. Through consideration of the needs of the users students and faculty members the research shows how design enhancements can have a dramatic impact on the performance of the system and general satisfaction of the users. In the end, the revised VLE has simplified the ability of instructors to encourage engagement with learning materials for their students, with educators being able to better manage teaching resources and monitor student progress.

B. Final Remarks

In conclusion, the study here highlights the need for requirement-driven systems. Through a user-centered design approach, South East Asian Institute of Technology, Inc.'s Virtual Learning Environment (VLE) was drastically enhanced, more accurate, functional, and manageable. The study proved that even minute, targeted design improvements can simplify the user experience, be more interactive, and intuitive.

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APPENDICES

A. Appendix A: Interview Questions

Questions	Strongly	Agree	Neutral	Strongly	Disagree
	Agree	9		Disagree	8
1. The VLE performs tasks smoothly without crashing or					
freezing.					
2. All the main features of the VLE (e.g., quiz submission, assignment upload, discussion forum) work properly.					
3. I can easily log in and access my account on the VLE without technical issues.					
4. The VLE loads pages and content quickly and efficiently.					
5. Notifications and alerts from the VLE (e.g., deadlines, updates) function as expected.					
6. The VLE is compatible with different devices such as mobile phones, tablets, and computers.					
7. Multimedia content (e.g., videos, audio, PDFs) plays and opens properly in the VLE.					
8. The search and filter functions in the VLE help me locate content or materials easily.					
9. I am able to interact with instructors and classmates smoothly through the platform.					
10. Overall, the system functions as expected and supports my learning tasks effectively.					

Table 5 Appendix A: Interview Questions

Questions	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
1. The VLE is easy to access regardless of device or location					
2. I find it difficult to locate important features in the VLE					
3. The text and interface elements are too small or hard to read					
 Clear navigation aids (e.g., menus, links) are available and helpful 					
5. The color contrast in the VLE makes it hard to distinguish text and icons					
6. The interface is adaptable to different screen sizes and resolutions					
7. I find the VLE confusing or overwhelming to use					
8. The design of the VLE encourages independent use without needing assistance.					
9. Buttons and clickable elements are easy to identify and interact with					
10. Overall, the VLE design supports accessible and inclusive learning					