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Assessment of the Impact of Using Virtual Learning Environment (VLE) on a Teacher's Engagement in Teaching

Kerrby Dizon, Mel Benjamin Montes, Princes Chryslene Hart Rubio, Ian Kyle Samillano, Kyla Tabayan, Johnny Villaflor, Zyann Visande, Cedie E. Gabriel MIT, **Reginald S. Prudente** MIT

South East Asian Institute of Technology, Inc,

College of Information and Communication Technology

Crossing Rubber, Tupi, South Cotabato

Philippines

ABSTRACT

This research explores the impact of Virtual Learning Environments (VLEs) on teaching engagement, particularly focusing on instructors of CICT department at the South East Asian Institute of Technology (SEAIT). It reveals that VLEs offer significant benefits, such as improved teaching flexibility, better organization, and enhanced engagement through tools like online assessments and multimedia resources. Teachers generally expressed confidence in using VLEs, citing features like progress tracking and resource sharing as critical to their instructional success. However, the study also uncovered challenges, including technical issues like system errors and slow performance, which disrupt teaching processes. These findings can inform the design of more efficient VLE system, fostering better teacher-student interaction and ultimately advancing the quality of education.

Keywords: Human-Computer Interaction (HCI), Teacher Engagement, Educational Technology, Virtual Learning Environment (VLE), Teaching Effectiveness.

1.0 INTRODUCTION

1.1 Background and Context

The field of Human-Computer Interaction (HCI) has significantly advanced, enhancing the way individuals engage with technology. These developments have transformed our daily lives, work environments, and learning experiences. As technology becomes increasingly user-friendly, it enables people to operate more efficiently and effectively (Pushpakumar, R., et al., 2023). In the realm of education, this evolution has led to the emergence of tools like Virtual Learning Environments (VLE), which facilitate connections and knowledge sharing between teachers and students online (Nwabude, A. A., 2020). This research aims to evaluate the impact of VLE on a teacher's effectiveness in the classroom. Given the integration of digital tools in educational institutions, particularly at the South East Asian Institute of Technology (SEAIT), it is crucial to assess whether VLE enhances teaching effectiveness or presents challenges. The study seeks to explore the overall experiences, usage patterns, and benefits of utilizing VLE for teaching effectiveness.

1.2 Research Problem

The primary challenge lies in understanding how VLE influences teacher engagement in the classroom. It is still uncertain whether VLE genuinely enhances teaching or introduces obstacles such as technical difficulties or diminished engagement. Furthermore, it is essential to investigate how VLEs affect teachers' instructional styles through the adoption of this digital tool.

1.3 Research Questions and Objectives

Research Questions:

- What are teachers' overall experiences, and usage pattern when using Virtual Learning Environment (VLE) for teaching?
- What the benefits and challenges do teachers encounter while using VLE?
- How does the use of VLE affect an instructor's teaching style and effectiveness in delivering educational content?

Research Objectives:

- To determine teachers' familiarity with, and effectiveness in using, VLE platforms in their daily teaching.
- To analyse the benefits that VLE provide and the challenges that teachers encounter in integrating these tool into their teaching.
- To evaluate the impact of VLE on teachers' instructional approaches and their overall effectiveness in engaging students.

1.4 Justification and Significance

. This research is significant as it addresses the pressing need to assess how Virtual Learning Environments (VLE) influence teachers' engagement in their teaching practices through digital tools. With educational institutions like the South East Asian Institute of Technology (SEAIT) implementing VLE, it is crucial to determine whether these platforms enhance or impede teaching effectiveness. This understanding is vital for guiding future educational advancements and improving the integration of technology in learning environments. Expanding knowledge in the field of Human-Computer Interaction (HCI) is essential for optimizing digital tools that assist educators. By exploring teachers' experiences, this research aims to enhance user-centered VLE systems that cater to the needs of educators. It will offer valuable insights into how VLE affects instructional methods, ultimately refining these platforms for improved user interaction.

2.0 LITERATURE REVIEW

2.1 Activity and Distributed Cognition Theory of HCI in VLE for education

Human-Computer Interaction (HCI) includes a variety of theories and models that inform the design and assessment of interactive systems. Among these, Activity Theory and Distributed Cognition stand out. Activity Theory focuses on the context of human activities, emphasizing the relationship between users, tools, and tasks (Clemmensen, T. et al. 2024). This framework deepens our understanding of learning processes within Virtual Learning Environments (VLEs) by analysing how teachers and students engage with technology to meet educational objectives. Conversely, Distributed Cognition posits that cognitive processes are not solely individual but are shared across people, tools, and environments, underscoring how VLE can promote collaboration and information exchange among educators and learners (Hollan et al., 2024). Both theories have adapted alongside technological advancements, becoming increasingly pertinent in online learning settings. The incorporation of artificial intelligence and adaptive learning technologies within VLEs reflects current trends in HCI, highlighting the importance of user-centered design to enhance teacher effectiveness.

2.2 Review recent studies, papers, and advancements in HCI

Recent studies in Human-Computer Interaction (HCI) have highlighted various trends and emerging areas, especially concerning Virtual Learning Environments (VLEs) and their influence on teaching effectiveness. A notable trend is the growing adoption of adaptive learning technologies, which customize the educational experience by modifying content and teaching methods according to individual student needs, thus improving teachers' ability to manage diverse classrooms. For example, Munoz et al. (2022) investigate how adaptive learning systems can enhance educational outcomes by offering personalized resources and feedback to both educators and students. Another developing area is the use of augmented reality (AR) in education, which has been found to boost engagement and interactivity in VLEs, ultimately leading to better teaching effectiveness.

A systematic review by Garzon et al. (2021) emphasizes how AR can create immersive learning experiences that positively influence educational results. However, current VLE solutions often encounter challenges that limit their

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effectiveness. For instance, Moodle, a popular platform, provides many features for course management but has been criticized for its complicated user interface and steep learning curve, which can undermine its intended advantages (Gamage, 2022). On the other hand, Google Classroom is commended for its intuitive interface and smooth integration with other Google services; however, it falls short in terms of customization and advanced analytics, which limits educators' ability to adapt the learning experience to their specific requirements (Christanto, 2023).

2.3 Analyse existing solutions related to the research problem

When assessing the impact of Virtual Learning Environments (VLEs) on teaching effectiveness, it's important to examine the current solutions and their shortcomings. One popular platform, Moodle, offers a wide range of tools for course management; however, it struggles with usability, as many educators find its complex user interface creates a steep learning curve that hampers effective teaching (Gamage, 2022). On the other hand, Google Classroom is often praised for its user-friendly design and simplicity, making it easy to distribute assignments quickly. Yet, it falls short in terms of advanced customization options and detailed analytics, which can limit educators' ability to personalize learning experiences and effectively track student progress (Christanto, 2023). These shortcomings reveal significant gaps in the current landscape, indicating a need for more intuitive interfaces and improved functionalities in VLEs. The research will be guided by Activity Theory and Distributed Cognition; Activity Theory will help explore the interactions between teachers, students, and educational tools during the teaching process, while Distributed Cognition will shed light on how VLEs serve as cognitive resources that influence teaching effectiveness. This theoretical framework will assist in pinpointing the limitations of existing solutions and guide the creation of more effective educational technologies.

3.0 METHODOLOGY

3.1 Research Design

This study will utilize a survey approach, incorporating qualitative research methods through a case study design to examine how the use of Virtual Learning Environments (VLE) affects teachers' effectiveness in their teaching. This design allows for a thorough understanding of VLE's impact; the quantitative aspect will assess teacher effectiveness using standardized assessments, while the qualitative aspect will offer deeper insights into teachers' experiences and perceptions regarding VLE.

3.2 Participants

The main participants in this study were teachers from the CICT Department at the South East Asian Institute of Technology (SEAIT). To ensure variability, inclusion criteria required that teachers had experience using a VLE. Participants were recruited through a personal approach, and consent was obtained to guarantee a voluntary and informed process.

3.3 Data Collection

Quantitative data were gathered through structured surveys aimed at measuring teachers’ frequency of VLE usage and their perceived effectiveness in teaching. The survey included Likert scale questions (e.g., frequency of VLE use, perceived improvement in teaching effectiveness) as well as closed-ended questions to facilitate quantifiable responses. The data collected from these surveys were appropriate for statistical analysis, enabling the identification of trends and patterns in VLE usage and its correlation with teaching effectiveness.

3.4 Data Analysis

The survey data were analyzed using various statistical methods, including descriptive statistics like mean, median, and standard deviation, to summarize the patterns of teachers' usage of the VLE. Inferential statistics, such as correlation analysis, were employed to explore the relationship between how often the VLE was used and the perceived effectiveness of teaching. The results offered a statistical overview of how VLE usage influenced teaching outcomes, with data presented in charts or graphs to emphasize significant trends.

3.5 Ethical Considerations

Informed consent was secured from all participants, ensuring they understood the study's objectives. Anonymity was preserved to safeguard individual identities. Furthermore, participants were made aware of how their data would be utilized, fostering transparency throughout the research process and reinforcing a commitment to ethical research standards.

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4.0 ADVANCED HCI SYSTEM DESIGN

4.1 System Architecture

The architecture of the advanced HCI system for the SEAIT Virtual Learning Environment is crafted to promote efficient teaching and effective learning. The system is built around several essential components:

- **User Interface (UI):** This serves as the primary interaction layer for users, presenting all necessary features and functionalities in a clear and organized way.
- **Backend Database:** This component is responsible for securely storing user data, class information, assignments, and performance analytics, ensuring data integrity and quick access.
- **Communication Module:** This module facilitates messaging, announcements, and real-time updates between educators and students, enhancing interaction and engagement.
- **Assessment and Reporting Engine:** This engine manages the creation, administration, and scoring of assessments, providing feedback and analytics on student performance.

Key Interactions: Users can navigate through their classes, send messages, access assessments, and monitor performance through a cohesive workflow that seamlessly connects all components.

4.2 Features and Functionalities

The proposed VLE incorporates several key features aimed at enhancing the educational experience:

Class Management: Teachers can easily add new classes, define subjects, and set the school year using the "Add Class" feature located on the right side.

Performance Monitoring: This feature showcases top-performing students along with their profiles and rankings, such as "Brainiac Emperor" and "Academic Titan."

Content Sharing: Lessons, announcements, and assessments can be uploaded quickly and effortlessly.

Portfolio and Shared Files This allows teachers to efficiently organize and distribute their teaching materials.

Assessment Tools: Teachers have the ability to create and manage assessments tailored for specific blocks or classes.

These functionalities address the research problem by streamlining the teaching process, enhancing student engagement through performance tracking, and promoting communication within the learning environment.

4.3 User Interface Design

Design Principles:

- **Ease of Navigation**: Menus are clearly labeled (e.g., "My Class," "Notification," "Assessment") for intuitive access to various functionalities.
- **Responsiveness**: The interface adjusts seamlessly to different devices, allowing teachers to manage tasks on desktops, tablets, or smartphones.
- **Aesthetic Appeal**: The design is clean and modern, featuring consistent branding and a clear visual hierarchy, including the SEAIT logo and organized dashboard sections.

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Visual Representation:

Figure 1.0: Teachers Login Page.

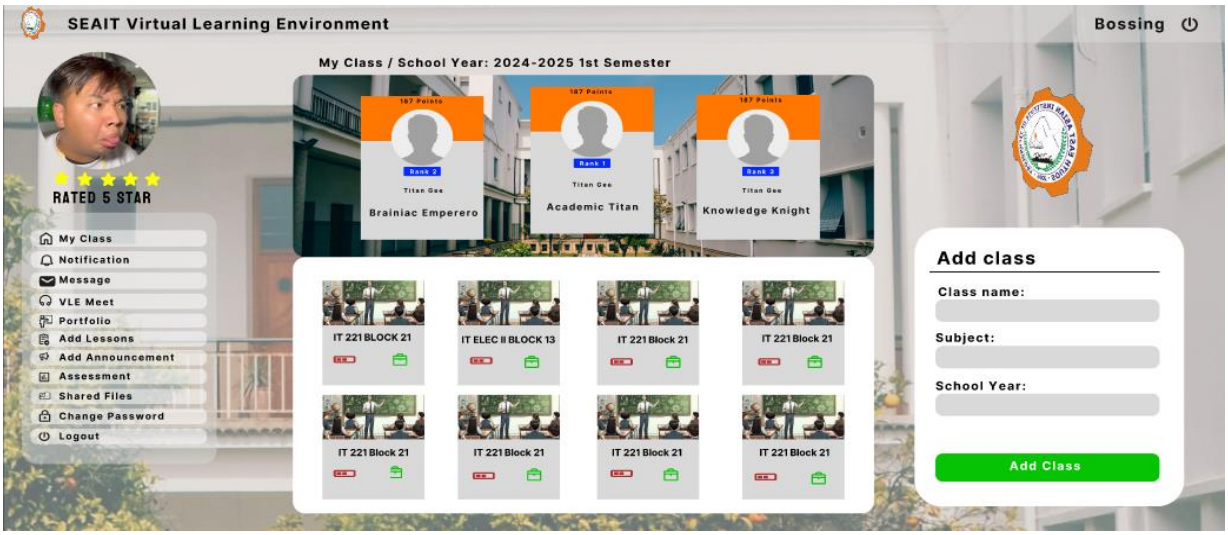

Figure 1.1: Class Management.

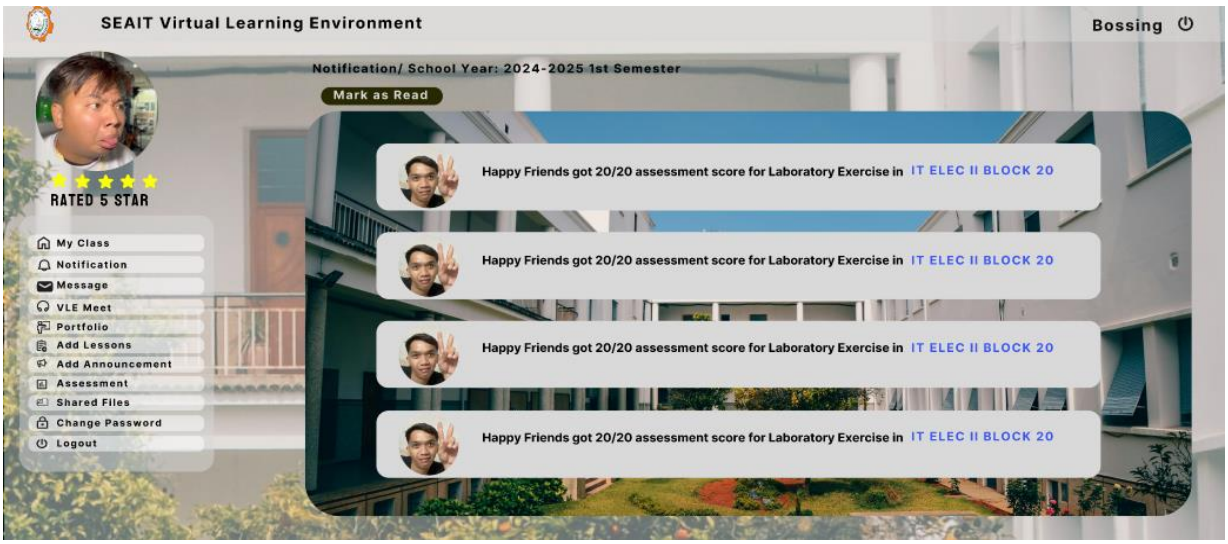

Figure 1.2: Teacher's Notification Display.

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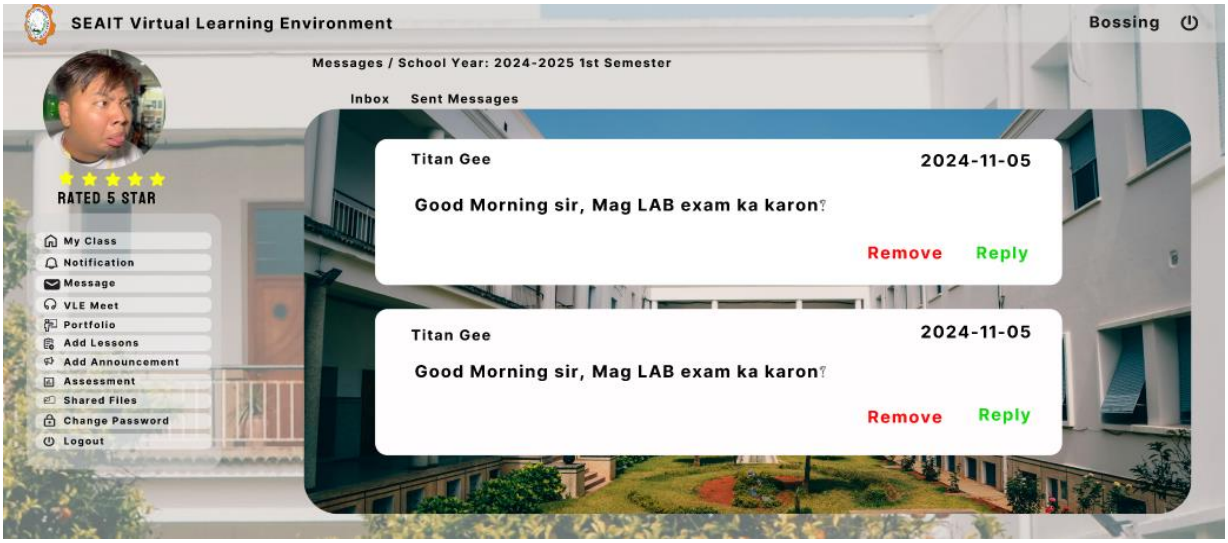

Figure 1.3: Teacher Dashboard, Display Messages.

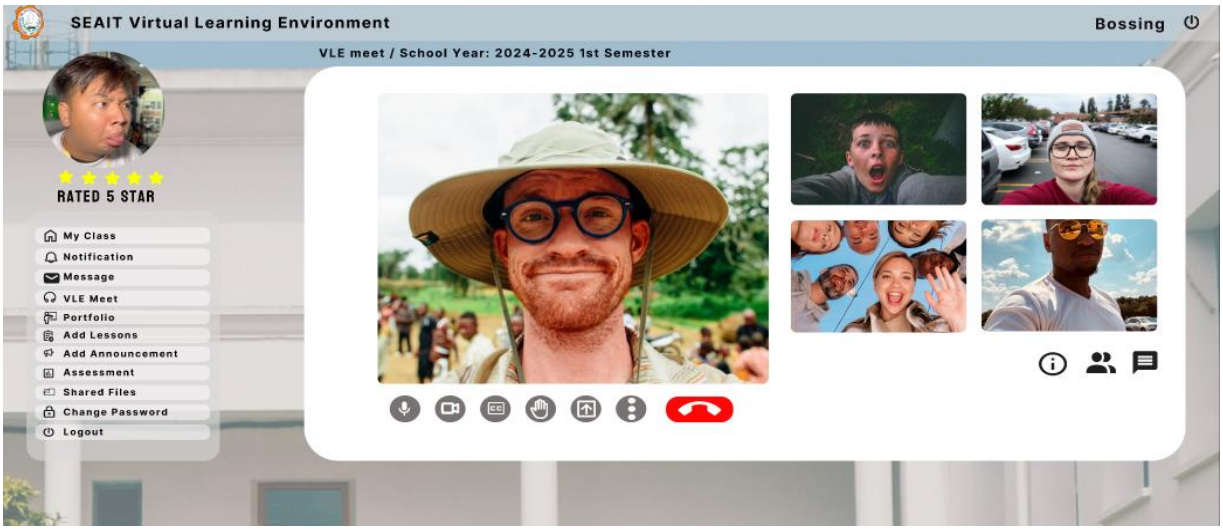

Figure 1.4: Teacher Dashboard, VLE meet.

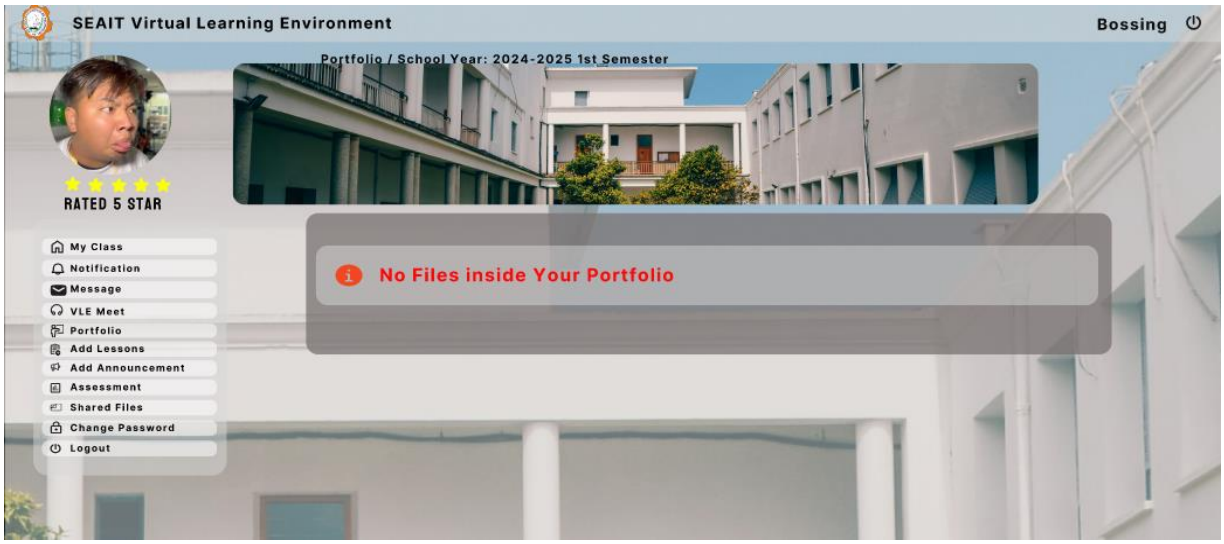

Figure 1.5: Teacher Dashboard, Portfolio.

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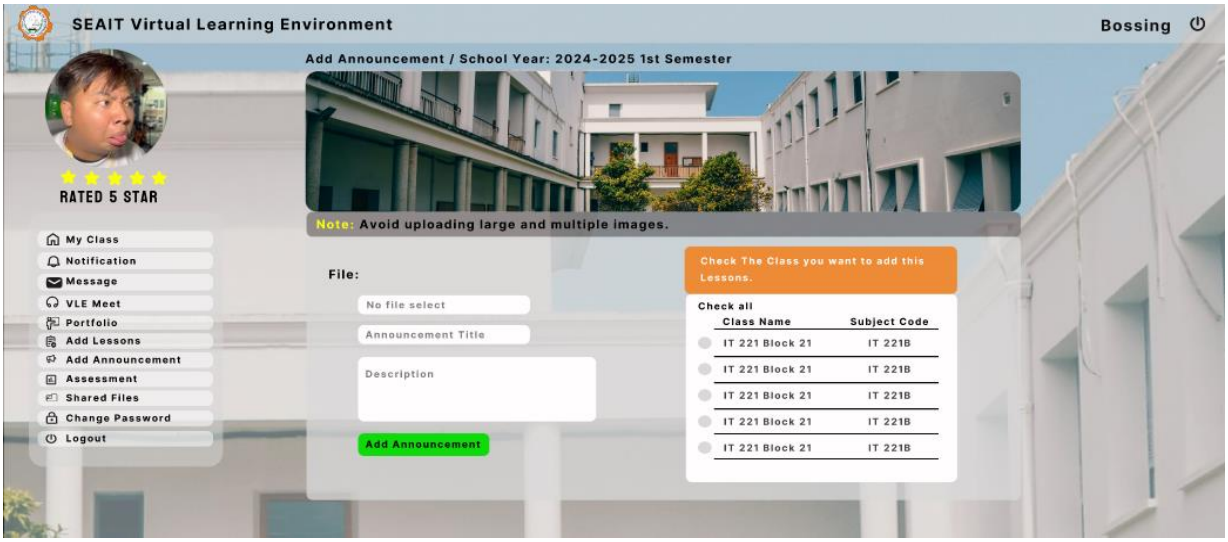

Figure 1.7: Teacher Dashboard, Adding Announcement.

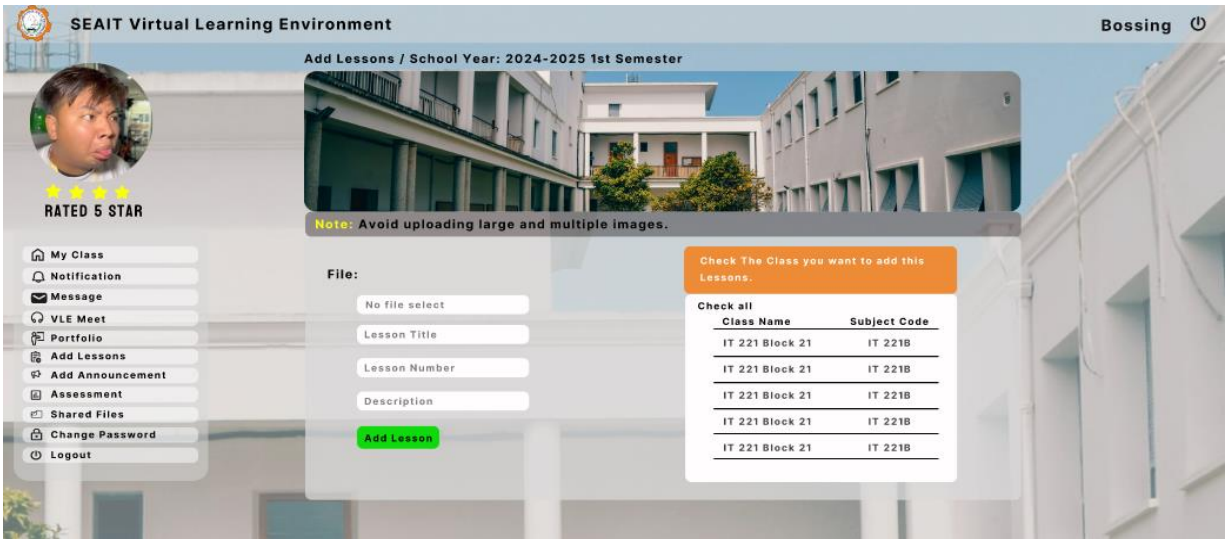

Figure 1.8: Teacher Dashboard, Add Lessons.

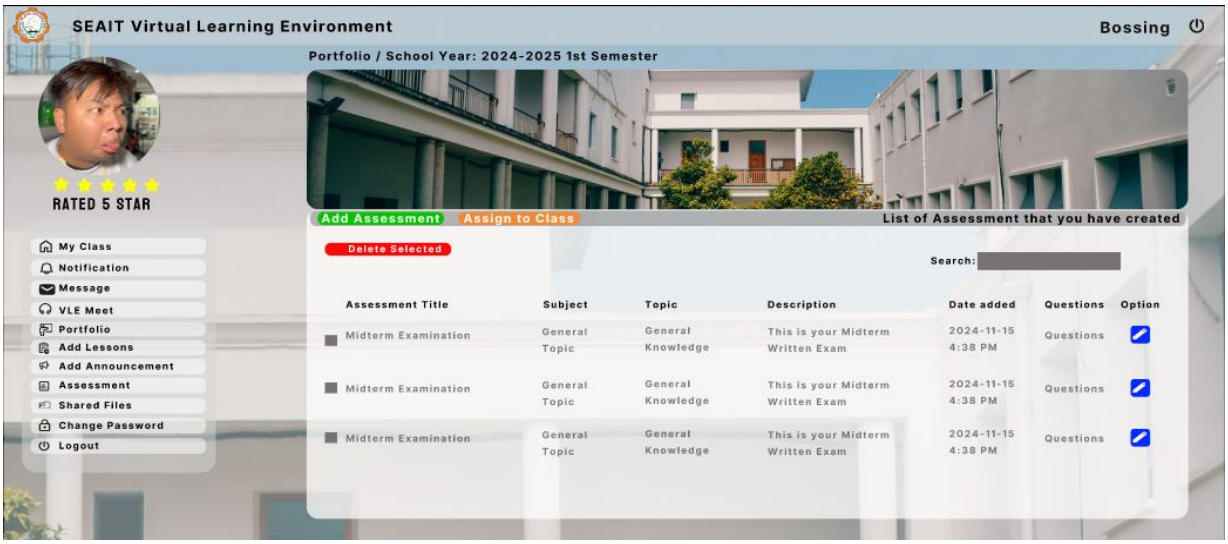

Figure 1.9: Teacher Dashboard, Add Assessment.

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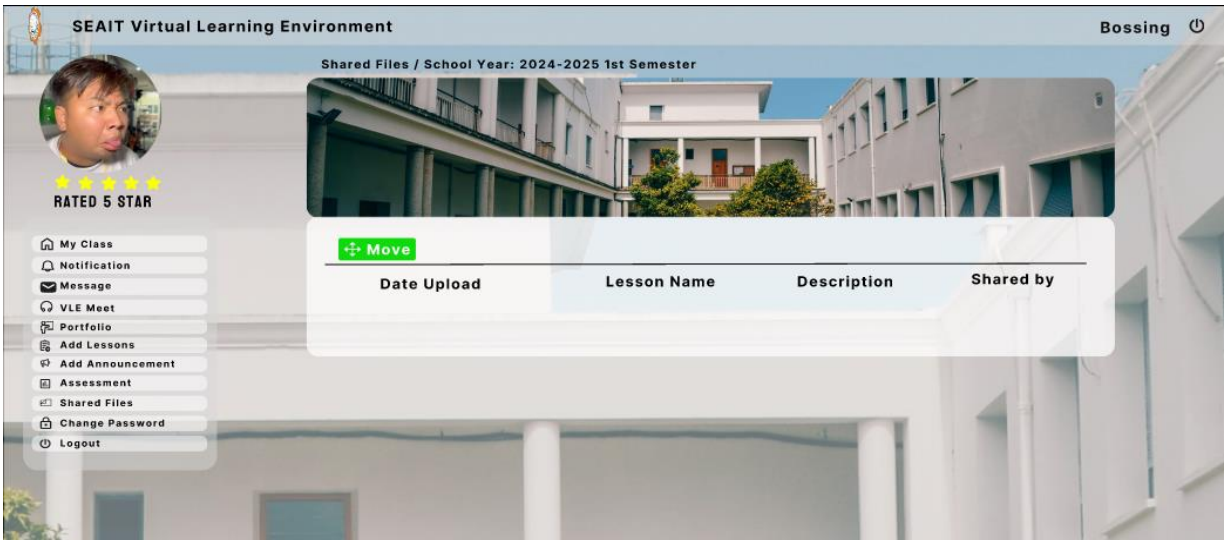

Figure 2.0: Teacher Dashboard, Display Shared files.

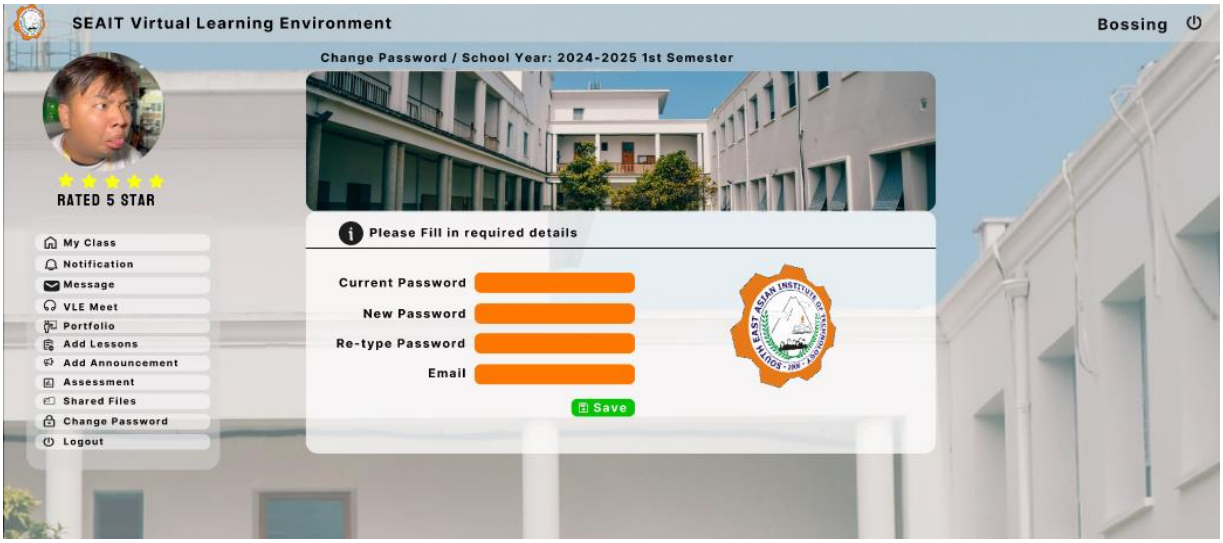

Figure 2.1: Teacher Dashboard, Change Password.

5.0 EVALUATION AND RESULTS

5.1 Usability Testing

Usability testing involved a survey distributed to teachers to collect quantitative data on their experiences, ease of use, satisfaction, and the perceived impact on their teaching engagement. The survey included Likert-scale questions, and the data were analyzed using statistical methods, such as descriptive statistics (e.g., mean, median, standard deviation) to summarize the patterns of teachers' usage of the VLE.

5.2 Performance Metrics

These metrics are designed to assess the VLE's impact on teaching effectiveness, engagement, and identify potential areas for improvement in usability and support. The results measure teacher confidence, perceived effects on teaching style, and specific challenges, offering a clear overview of the VLE's performance and usability.

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Table no. 1 VLE's impact on teaching

Variable	Mean	Median	Standard Deviation
Frequency of VLE Usage	3.65	4	0.65
Overall Experience with VLE	4.41	5	0.66
Most Useful VLE Features	4.71	5	0.46
Confidence in Using VLE	4.18	4	0.61
Benefits Experienced Using VLE	3.24	3	0.76
Challenges Faced Using VLE	4.88	5	0.34
Impact on Teaching Style	4.18	4	0.39
Changes in Teaching Methods	4.24	5	0.76
Impact on Teaching Effectiveness	4.53	4	0.51

Calculate the Correlation

To calculate the **Pearson correlation** coefficient between **VLE Usage** (independent variable) and **Teaching Effectiveness** (dependent variable), we can use the formula:

$$r = \frac{\sum (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum (X_i - \bar{X})^2 \sum (Y_i - \bar{Y})^2}}$$

Where:

- Xi= value of **VLE Usage** for participant iii
- Yi = value of **Teaching Effectiveness** for participant iii
- $\bar{X}$ = mean of **VLE Usage**
- $\bar{Y}$ = mean of **Teaching Effectiveness**

We already have the following values:

- **VLE Usage**: [4, 4, 4, 4, 4, 4, 4, 2, 2, 4, 2, 4, 4, 4, 4, 4, 4]
  - Mean of VLE Usage ($\bar{X}$): 3.65
- **Teaching Effectiveness**: [4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 5, 5, 5, 5, 5, 5]
  - Mean of Teaching Effectiveness ($\bar{Y}$): 4.53

Let's calculate the correlation step by step:

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Compute Deviations and Products

For each participant iii, calculate the deviation from the mean for **VLE Usage** and **Teaching Effectiveness**, then their product:

Table no. 2 VLE Usage and **Teaching Effectiveness**

Participant	VLE Usage Xi	Teaching Effectiveness Yi	$Xi-\bar{X}$	$Yi-\bar{Y}$	Product $(Xi-\bar{X})(Yi-\bar{Y})$
1	4	4	4 - 3.65 = 0.35	4 - 4.53 = -0.53	0.35 * -0.53 = -0.1855
2	4	4	0.35	-0.53	-0.1855
3	4	4	0.35	-0.53	-0.1855
4	4	4	0.35	-0.53	-0.1855
5	4	4	0.35	-0.53	-0.1855
6	4	4	0.35	-0.53	-0.1855
7	4	4	0.35	-0.53	-0.1855
8	2	4	2 - 3.65 = -1.65	4 - 4.53 = -0.53	-1.65 * -0.53 = 0.8745
9	2	4	-1.65	-0.53	0.8745
10	4	4	0.35	-0.53	-0.1855
11	2	4	-1.65	-0.53	0.8745
12	4	5	0.35	5 - 4.53 = 0.47	0.35 * 0.47 = 0.1645
13	4	5	0.35	0.47	0.1645
14	4	5	0.35	0.47	0.1645
15	4	5	0.35	0.47	0.1645
16	4	5	0.35	0.47	0.1645
17	4	5	0.35	0.47	0.1645

Sum the Products and Squared Deviations

- **Sum of products**:

  $\sum(Xi-\bar{X})(Yi-\bar{Y})=(-0.1855+-0.1855+...+0.1645)=1.56$
- **Sum of squared deviations for VLE Usage**:
  $\sum(Xi-\bar{X})2=(0.352+0.352+...+(-1.65)2)=9.88$
- **Sum of squared deviations for Teaching Effectiveness**:
  $\sum(Yi-\bar{Y})2=(-0.532+-0.532+...+0.472)=5.47$

Compute the Pearson Correlation Coefficient

$$r = \frac{1.56}{\sqrt{9.88 \times 5.47}} = \frac{1.56}{\sqrt{54.06}} = \frac{1.56}{7.34} = 0.21$$

The Pearson correlation coefficient (r) between VLE Usage and Teaching Effectiveness is 0.21, indicating a weak positive correlation. This means that there is a slight relationship between how often VLE is used and how effective teaching is perceived to be, but the correlation is not strong. This finding suggests that other factors, such as teaching methods, student engagement, or the quality of VLE tools, may have a more substantial impact on teaching effectiveness.

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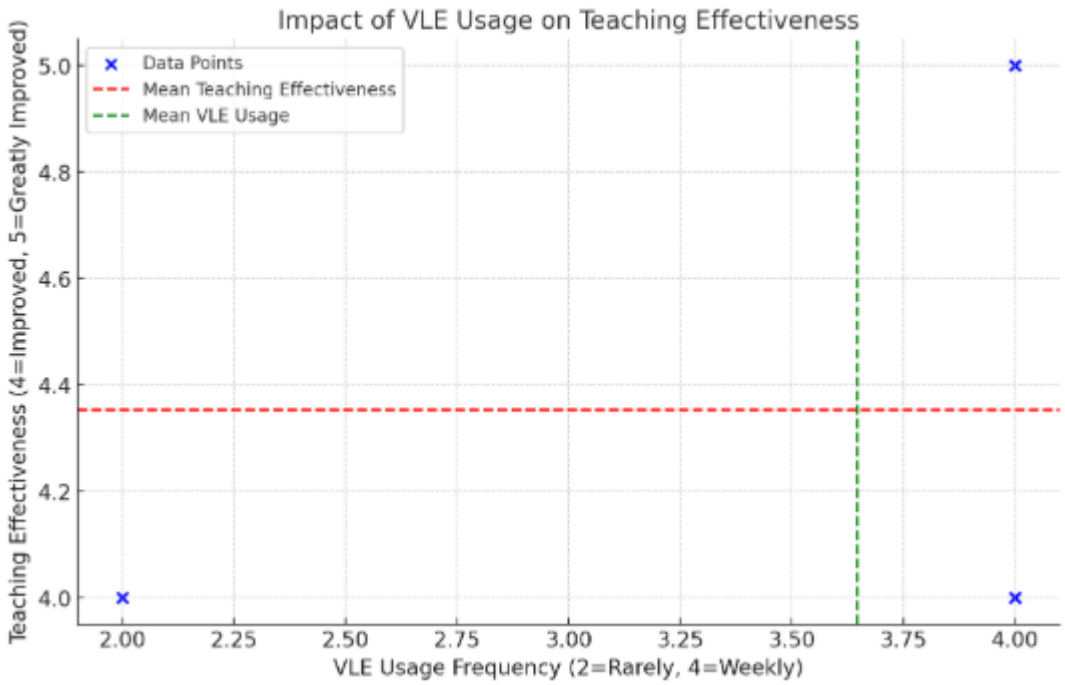

*Figure 1.0: Displays the relationship between **VLE Usage Frequency** and **Teaching Effectiveness**. Includes horizontal and vertical lines representing the mean values for both variables. Highlights a trend where higher VLE usage correlates with slightly improved teaching effectiveness*

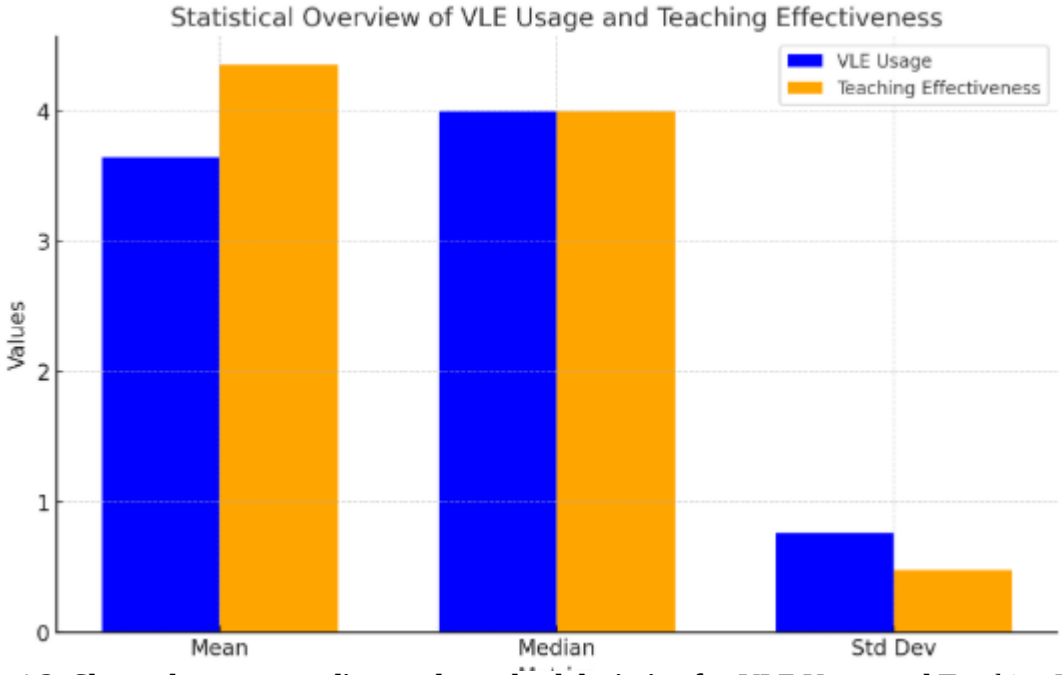

Figure 1.2: Shows the mean, median, and standard deviation for VLE Usage **and** Teaching Effectiveness**. Provides a quick comparison of the central tendency and variability for both variables.**

5.3 Comparative Analysis

In this section, we examine the survey data alongside the usage patterns of the VLE. We analyze how varying levels of VLE usage—low, medium, and high—correlate with teaching effectiveness. Teachers who utilize the VLE

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more frequently generally report greater satisfaction and increased confidence in their teaching abilities. However, the link between VLE usage and teaching effectiveness is not particularly strong, suggesting that other elements, such as teaching style or student engagement, may also play a significant role in determining effectiveness. We also compare these findings with earlier studies on VLE usage to assess whether the results align or reveal any discrepancies.

5.4 Results and Findings

The findings indicate that, overall, teachers who engage with the VLE more regularly report enhanced teaching effectiveness. On average, those who frequently use the VLE feel more assured and notice a positive influence on their teaching methods. The most beneficial features of the VLE, including communication tools and resource sharing, are those that facilitate better interaction with students. Nevertheless, some teachers encountered difficulties with the VLE, particularly concerning technical issues and the time needed to incorporate it into their teaching. Despite these obstacles, the general sentiment towards the VLE was favorable, with most teachers believing it has led to improved teaching outcomes.

6.0 DISCUSSION

6.1 Interpretation of Findings

The analysis indicates a weak positive correlation between the frequency of VLE usage by teachers and their perceived effectiveness in teaching. This suggests that while utilizing the VLE may enhance teaching, it is not the sole influencing factor. Other elements, such as teaching strategies and student involvement, might play a more significant role in determining teaching quality. The challenges faced by some educators, including technical difficulties and time limitations, highlight that although VLEs offer potential advantages, there are still barriers to their complete integration into educational practices.

6.2 Contributions and Innovation

This research enhances our understanding of the impact of VLEs on teaching effectiveness. While earlier studies have pointed out the advantages of VLEs, this research reveals that the connection between VLE usage and teaching effectiveness is not as robust as anticipated. It underscores the necessity of considering additional factors, such as teacher readiness and student participation, when assessing the effectiveness of VLEs. Moreover, the study presents a fresh perspective on how teachers engage with and utilize VLEs, which could inform future enhancements to these platforms.

6.3 Limitations and Future Work

This study has certain limitations. The sample size is relatively small, and the data collection was based on self-reported information from teachers, which may not accurately reflect the true effects of VLEs. Future research should aim for a larger and more varied sample of educators and examine the long-term impacts of VLE usage on teaching. Additionally, future studies could explore other aspects, such as the quality of VLE tools and student feedback, to gain a more comprehensive understanding of how VLEs influence teaching effectiveness.

7.0 CONCLUSION

7.1 Summary of Key Findings

The study revealed that the use of VLEs has a slight positive effect on teaching effectiveness. Educators who engaged with the VLE more often expressed greater confidence and a more satisfying teaching experience, although they still faced challenges like technical difficulties and limited time.

7.2 Final Remarks

Although VLEs offer potential advantages, they are not universally applicable. Teachers require assistance to utilize these platforms effectively, and additional research is necessary to identify ways to address the current

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challenges. By gaining insights into the role of VLEs in education, teachers can make better-informed choices about how to incorporate these tools into their classrooms for optimal results.

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APPENDICES:

Title: "**Assessing The Impact of Using Virtual Learning Environment (VLE) on a Teacher's Effectiveness in Teaching"**

Gender:_____ Age:_____ Department:_____

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Survey questions

Direction: Please answer the following, Encircle the letter of your answer.

How frequently do you use the Virtual Learning Environment (VLE) in your teaching?
(a) Daily
(b) Weekly
(c) Monthly
(d) Rarely
(e) Never

How would you rate your overall experience using the VLE?
(a) Very positive
(b) Positive
(c) Neutral
(d) Negative
(e) Very negative

How confident are you in your ability to navigate and use the VLE tools effectively?
(a) Very confident
(b) Confident
(c) Neutral
(d) Not confident
(e) Very unconfident

Which of the following VLE features do you find most useful in enhancing your teaching?
(a) Online assessments
(b) Discussion forums
(c) Multimedia content
(d) Collaborative tools (e.g., group projects)
(e) Other: _____

To what extent has using VLE affected your teaching style?
(a) Significant change
(b) Moderate change
(c) Slight change
(d) No change

What teaching methods have you adopted or modified due to the integration of VLE?
(a) More interactive activities
(b) More multimedia usage
(c) Less traditional lecturing
(d) Increased student collaboration
(e) Other: _____

What benefits have you experienced while using VLE in your teaching?
(a) Improved student engagement
(b) Better tracking of student progress
(c) Easier access to teaching materials
(d) Flexibility in teaching methods
(e) Other: _____

How do you assess the quality of student learning when using VLE compared to traditional methods?
(a) Much better with VLE
(b) Somewhat better with VLE
(c) About the same
(d) Worse with VLE
(e) Much worse with VLE

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What challenges do you encounter while using VLE?

(a) Technical issues (e.g., system errors)
(b) Lack of training or support
(c) Limited student participation
(d) Time-consuming to manage
(e) Other: _____

How has the VLE impacted your overall teaching effectiveness?

(a) Greatly improved
(b) Improved
(c) No effect
(d) Decreased
(e) Greatly decreased

Interview:

Share your detailed experiences in using vle and make a suggestion for improving the vle?

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