Study on LMS Usage at NIBM

Group No: 14

Higher National Diploma in Software Engineering

Statistics Course Work Documentation

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Content

1. Introduction

1.1 Background Information

In a world that has advanced digitally, Learning Management Systems (LMS) are becoming essential in administering academic work and disseminating teachings and study materials. Organizations such as the National Institute of Business Management (NIBM) employs LMS platforms for quicker administrative processes, allowing for student engagement and provision of course materials. Nevertheless, the use of LMS is impacted by several factors including user discipline, system characteristics, and availability. To identify the usage pattern of LMS at NIBM, this research intends to put forward the primary usages of factors through student participation trends and a formulated conceptual framework. As part of the study, a questionnaire is designed with the aim of collecting data which will later be subjected to statistical analysis in order to uncover the relationships of different variables with the effectiveness of the LMS. This research aims to investigate how learners interact with the system, what challenges they experience, and how the system should be modified to enhance learning benefits. These variables will assist NIBM in formulating strategic redesigns of their learning management system (LMS) that would address the students' needs and enhance academic performance. The findings of the study will contribute to existing literature while providing recommendations on proper implementation of LMS.

1.2 Problem Statement

The gradually decreasing rate of LMS access and usage by the students has been a major problem by the authority and lectures of the organization as it directly influences the academic grading of students.

1.3 Objective

The end goal of this study is to determine the key factors affecting the NIBM LMS usage and take actions to increase the productivity, usability and efficiency of the LMS to get its maximum use by the students while increasing the user experience through a logical and statistical methodology and providing appropriate reasonings.

1.4 Hypotheses

The key factors which were hypothesized as affecting NIBM LMS usage are mentioned as follows.

1. Demographic Information

Information regarding age (Q1), gender (Q2), enrolled course (Q4), and early experiences (Q3) were collected under this category.

These may directly influence the satisfaction of the expected output by the LMS users as the adaptability, dependency and expectations are different from each other.

When we consider the expected outcome related to these factors,

- Younger aged students engage in LMS more often than elder ages while elder ages often report issues related.
- Gender is not a much affecting factor towards LMS usage
- Early experiences of LMS usage may affect overall satisfaction
- Students who are enrolled in higher courses may use the LMS much than lower courses

2. Usage Pattern and Purpose

Usage patterns can be measured by the average duration of usage (Q6), time of the day (Q7), accessed devices (Q8) and purposes (Q9).

These factors may influence the rate of the usage of LMS by the users.

According to the hypothesized assumptions,

- The users who have a higher session time may rate the LMS with higher satisfaction.
- The users who use the LMS at night may experience technical difficulties such as loading speed or system crashes.
- Users who access LMS using a laptop may rate the navigation and UI with higher rates.
- Students may not be limited to a single purpose, and they may access the LMS for multiple factors.

3. User Experience

User experience of a user basically relay based on the satisfaction in lecture materials (Q13), loading speed (Q10), UI (Q11), ease of navigation (Q12), support services (Q14, Q15).

Given above factors are some outcomes by the other factors which affect the usage of LMS.

According to expected outcomes,

- Unsatisfied lecture materials will be a reason to lower session durations
- Experience in missing deadlines also will be a result for bad reviews
- Ease of navigation might be a review of satisfied users, especially if it can be an individual who accesses the LMS often with a laptop
- Supported services will be a considerable factor for those who face problems with the LMS.

4. Technical issues and challenges

When it comes to the technical challenges system crashes (Q15), issues when login (Q16) and experience in deadline missing (Q17) can be identified.

The above-mentioned factors will be affecting the user process, experience and satisfaction with the LMS.

- System crashes may lead to reduced user satisfaction
- Issues in login can be a reason to missed deadlines with bad system satisfaction
- Loading speed of the website is an impact of unscalable application which lady reduced satisfaction

5. Privacy and Security

In terms of privacy and security the information of credential shared with others or not (Q20), and feedback of security (Q21) were gathered.

This information was gathered to get an idea of how people react to websites security based on their experience with LMS.

In brief as per assumptions,

- When an individual shares the personal credentials, they might have most probably experienced security related problems.
- Feedback for security will be positive or negative according to their system experiences.

6. Suggestions

Suggestions related to having an AI chatbot (Q19), additional features to add (Q23), unnecessary features to remove (Q22) have been gathered from the users.

These may directly reflect the increase of the user experiences and gaps they go through.

2. Literature review

The effectiveness of a learning management system (LMS) is affected by numerous factors including student engagement, institutional backing, and accessibility. Research suggests that reliance on the internet, the availability of mobile devices, and appealing design increase the use of LMS. Students with active participation in forums and quiz resources perform better academically. Proper technical support and training from relevant organizations also lead to improved participation and resource utilization. These two statistical methods- regression models and correlation analysis - help in evaluating the impact of various factors on the efficiency of LMS usage. Considering these elements, educational institutions such as NIBM can improve the LMS to better the learning experience for students.

3. Conceptual Framework

Variables and relationships are the key concepts of the research survey is structured and visually represented, and it is known as a conceptual framework. It is also known as theoretical framework research framework. By using the conceptual framework, we can identify the relationship between key variables. It helps the survey define independent variables and dependent variables as follows.

1. **Independent Variables**

The following have been identified as independent variables which affect usage of NIBM. These can be used as the static or input variable which manipulated to find the effect. Those are,

- Demographic information
- User pattern and purpose
- Privacy and security
- Technical issues and challenges

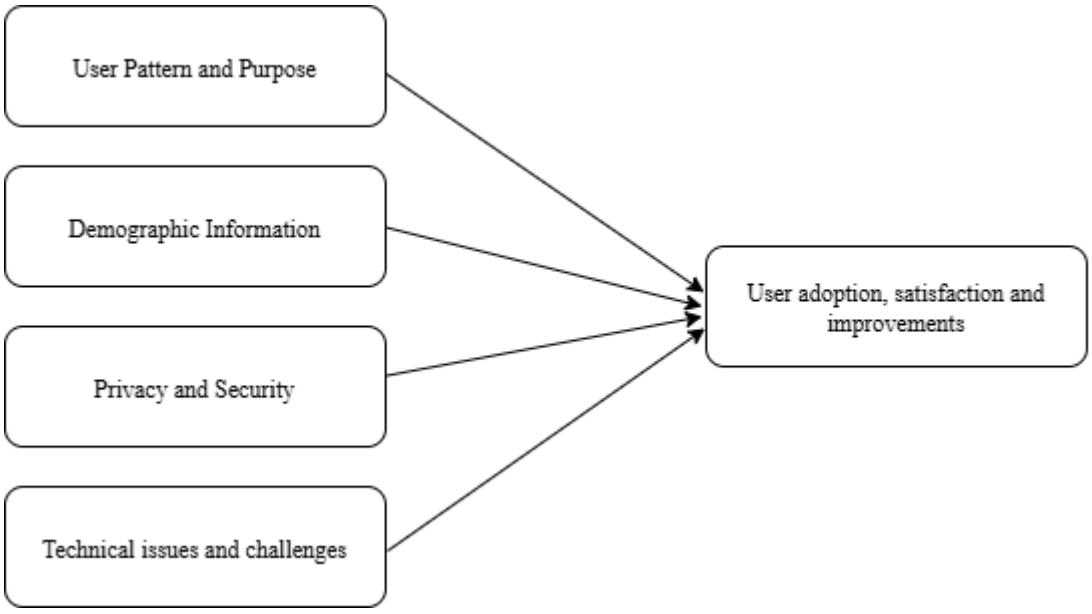
Each factor with related information and expected outcomes were explained in section 1.4 Hypothesis.

2. **Dependent Variables**

The variables which act as the outcomes based on collected user input data. The major dependent variable which can be identified is,

- User adoption, satisfaction and improvements

A conceptual framework to depict the selection of independent and dependent variables can be depicted as below.



The expected outcome of each factor has been explained under 1.4 Hypotheses.

4. Methodology

4.1 Data Gathering

Data concerning all factors discussed were captured using a questionnaire including six areas based on the type of questions from the **students at NIBM School of Computing Colombo branch (Target Population).** Among them **40 students (sample space)** were selected in order to collect sample data for the research. To enhance the precision of each respondent's preferences for LMS usage, we applied **stratified sampling**. Students were categorized based on the course they followed and randomly students were selected from those groups to proceed with the stratified sampling technique. When gathering information many dependent and independent variables regarding the NIBM LMS usage has been measured which will be discussed prior. Stratified sampling technique was selected in order to capture the whole population of students who follow all the types of courses at NIBM for better accuracy of results, even distribution among students' representation and for proper comparison in between selected subgroups.

As the **data collection process**, a questionnaire was distributed among students using a printed questionnaire form. The researchers managed to collect data from classrooms in NIBM at interval time periods which belonged to selected courses and request students to complete the form.

4.2 Questionnaire

Research study on NIBM LMS usage

1. Select your age group — 15-18 ☐ 18-21 ☐ 21-24 ☐ 24-27 ☐
2. Select your gender — Male ☐ Female ☐ Other ☐
3. Do you have prior experience on using LMS other than NIBM? — Yes ☐ No ☐
4. What is your enrolled course at NIBM — Certificate ☐ Diploma ☐ HND ☐ Degree ☐

Select one or more answer(s).

5. How often you login into LMS per week? — 0 ☐ 2 ☐ 4 ☐ 6 ☐ 8 ☐ 10 ☐
6. What is the average duration of a LMS session with you? (in minutes) — 5 ☐ 10 ☐ 15 ☐ 20 ☐ 30 ☐
7. What time of the day you use LMS? — Morning ☐ Evening ☐ Night ☐
8. What device(s) you use to access LMS? — Mobile phone ☐ Tablet ☐ Laptop ☐
9. For what purpose(s) do you use the NIBM LMS
   - To submit assignments and coursework ☐
   - To Find Lecture materials ☐
   - For collaborative tasks such as discussions and groups ☐
   - Other ☐

   .....

Rank your opinion and experience from 1 to 5 (1 – less and 5 – high).

		1	2	3	4	5
10.	How would you rank the LMS when it comes to loading speeds?					
11.	To what level are you satisfied with LMS interface?					
12.	How easy do you find the navigation on the LMS?					
13.	How would you rate the lecture materials in LMS related to your module contents?					
14.	What is your level of satisfaction regarding the support service of the LMS?					

1

15. Have your ever experienced system errors or crashes when using LMS? Yes ☐ No ☐

If yes,

How often do you experience? Never ☐ Rarely ☐ Once a week ☐

What are those?

.....

16. Have you faced issues when log into LMS? Yes ☐ No ☐

17. Have you missed deadlines due to Issues of LMS? Yes ☐ No ☐

18. Have you ever contacted IT support or help section for LMS issues? Yes ☐ No ☐

if yes, Provide the specific reason.

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19. Do you prefer NIBM LMS should have an AI chatbot for support? Yes ☐ No ☐

20. Have you ever shared your LMS login credentials with others? Yes ☐ No ☐

21. Do you think your personal information are secure with in the LMS? Yes ☐ No ☐

If not, provide the specific reason and recommendation.

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Select one or more answer(s).

22. What features do you think unnecessary in NIBM LMS

Customization ☐ Access for library Navigation ☐

Calendar ☐ Access for nibm.lk website ☐

Other ☐

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23. What feature(s) you prefer and suggest there should be in LMS

Dark mode ☐ Notification system ☐

Language compatibility ☐ Offline study material access ☐

Other ☐

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5. Data Analysis

5.1 Descriptive Analysis of Numerical Data

6.What is the average duration of aLMS session with you? (in minutes)	
Mean	17.25
Standard Error	1.339130028
Median	15
Mode	15
Standard Deviation	8.469401941
Sample Variance	71.73076923

5.How often you login into LMS per week?	
Mean	4.25
Standard Error	0.399919864
Median	4
Mode	2
Standard Deviation	2.529315302
Sample Variance	6.397435897

5.2 Simple Linear Regression Analysis

1. How often do you login to the LMS per week Vs Satisfaction with LMS interface

- X - To what level are you satisfied with LMS interface (Q11)
- Y - How often do you login into LMS per week (Q5)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.066906125
R Square	0.00447643
Adjusted R Square	-0.021721559
Standard Error	2.556638062
Observations	40

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.116869192	1.116869	0.170869	0.681663976
Residual	38	248.3831308	6.536398		
Total	39	249.5			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4.826304503	1.451605697	3.324804	0.001968	1.887682403	7.764926604	1.887682403	7.764926604
X Variable 1	-0.178699071	0.432305129	-0.41336	0.681664	-1.053855052	0.69645691	-1.053855052	0.69645691

p-value = 0.681664

0.681664 ≠ 0.05

Since the p-value is greater than 0.05 the independent variable (how often login into the LMS) does not show a statistically significant relationship with the dependent variable (Satisfaction with LMS interface). In conclusion we can say that independent variable does not dependably forecast the dependent variable.

2. Average LMS session duration Vs loading speed
    - X - How would you rank the LMS when it comes to loading speeds (Q10)
    - Y - Satisfaction with LMS interface (Q11)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.504639
R Square	0.25466
Adjusted R	0.235046
Standard E	0.786033
Observatic	40

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	8.021801	8.021801	12.98347	0.000898
Residual	38	23.4782	0.617847		
Total	39	31.5			

	Coefficients	*tandard Erı*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	1.705504	0.446293	3.82149	0.000478	0.802031	2.608977	0.802031	2.608977
X Variable	0.478914	0.132911	3.603258	0.000898	0.209849	0.747978	0.209849	0.747978

p-value = 0.000898

0.000898 ≠ 0.05

Since the p-value is less than 0.05 the independent variable (Satisfaction with LMS interface(Q11) shows statistically significant relationship with the independent variable (Loading speed of the LMS). In conclusion we can say that dependent variable dependably forecast the independent variable. Which means loading speed affects user satisfaction.

3. How often do you login to the LMS per week Vs Level of satisfaction regarding to the support service of LMS
    - X - What is your level of satisfaction regarding the support service of LMS (Q14)
    - Y - How often do you login into LMS per week (Q5)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.20631
R Square	0.042564
Adjusted R Square	0.017368
Standard Error	2.507255
Observations	40

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	10.61963883	10.61964	1.689324	0.201519696
Residual	38	238.8803612	6.286325		
Total	39	249.5			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	5.837472	1.284102307	4.545955	5.42E-05	3.237942568	8.437001	3.23794257	8.437000999
X Variable 1	-0.43792	0.336931454	-1.29974	0.20152	-1.120005319	0.244159	-1.12000532	0.244158818

p-value = 0.20152

0.20152 ≠ 0.05

Since the p-value is greater than 0.05 the independent variable (How often you login into LMS per week) does not show a statistically significant relationship with the dependent variable (Satisfaction regarding the support service of LMS). In conclusion we can say that independent variable does not dependably forecast the dependent variable.

5.3 Correlation Analysis by Contingency Table

Two-way tables

1.Relationship between login frequency and how often you login into LMS per week.

Sum of 5.How often you login into LMS per week?	Column Labels				
Row Labels	2	3	4	5	Grand Total
0	0.00%	0.00%	0.00%	0.00%	0.00%
2	3.53%	2.35%	5.88%	1.18%	12.94%
4	4.71%	9.41%	9.41%	2.35%	25.88%
6	3.53%	21.18%	7.06%	3.53%	35.29%
8	4.71%	4.71%	4.71%	0.00%	14.12%
10	0.00%	5.88%	5.88%	0.00%	11.76%
Grand Total	**16.47%**	**43.53%**	**32.94%**	**7.06%**	**100.00%**

An average level of involvement is demonstrated by the fact that 76.47% uses the LMS three or four times a week. Only 7.06% of students use it five times a week indicates that daily usage is low. Although 16.47% of students only log in twice a week, no student reported never logging in, demonstrating the importance of the LMS for everyone. The high frequency of use—three to four times per week—indicates that students depend more on scheduled access than on daily visits.

2.Relationship between devices used to access LMS and ease of navigation on LMS

Count of 8.What device(s) you use to access LMS ?	Column Labels				
Row Labels	2	3	4	5	Grand Total
Laptop	7.50%	2.50%	12.50%	2.50%	25.00%
Mobile Phone	0.00%	5.00%	7.50%	0.00%	12.50%
Mobile Phone, Laptop	2.50%	17.50%	27.50%	2.50%	50.00%
Mobile Phone, Tablet	0.00%	5.00%	0.00%	0.00%	5.00%
Mobile Phone, Tablet, Laptop	0.00%	0.00%	5.00%	2.50%	7.50%
Grand Total	**10.00%**	**30.00%**	**52.50%**	**7.50%**	**100.00%**

The table above shows the most preferred devices are mobile phones and laptops for accessing the LMS (50%) according to other percentages students who use only mobile phone (12.5%) or only laptop (25%) or mobile phone and tablet both (5%) and the users who use all three devices (7.5%) founds the navigation in LMS not easy. Since the most users relies on mobile phones and laptops ensures a user-friendly navigation across LMS.

3.Relationship between enrolled courses at NIBM and which devices used to access LMS

Count of 4.What is your enrolled course at NIBM ?	Column Labels				
Row Labels	Certificate	Degree	Diploma	HND	Grand Total
Laptop	0.00%	10.00%	10.00%	5.00%	25.00%
Mobile Phone	7.50%	0.00%	2.50%	2.50%	12.50%
Mobile Phone, Laptop	7.50%	17.50%	15.00%	10.00%	50.00%
Mobile Phone, Tablet	0.00%	2.50%	0.00%	2.50%	5.00%
Mobile Phone, Tablet ,Laptop	2.50%	2.50%	0.00%	2.50%	7.50%
Grand Total	**17.50%**	**32.50%**	**27.50%**	**22.50%**	**100.00%**

Indicating a heavy dependence on digital devices, most students (50%) chose to use both a laptop and a mobile phone for their studies. The largest percentage of enrolled students (32.5%) are degree students (17.5%), who use this combination. Of the students, only 5-7.5% use tablets, making them the least popular. To properly assist the majority of students, it is suggested that educational materials be modified for laptops and mobile devices.

5.4 T-test

Qualitative vs Quantitative (2 levels)

Check whether easy navigation scores have a relationship with prior experience.

Hypothesis –

H0: There is no association between easy navigation and prior experience.

H1: There is an association between easy navigation and prior experience.

t-Test: Two-Sample Assuming Equal Variances		
	Variable 1	*Variable 2*
Mean	3.5714286	3.090909091
Variance	0.7724868	1.090909091
Observations	28	11
Pooled Variance	0.8585469	
Hypothesized Mean Difference	0	
df	37	
t Stat	1.4573775	
P(T<=t) one-tail	0.0767239	
t Critical one-tail	1.6870936	
P(T<=t) two-tail	0.1534479	
t Critical two-tail	2.0261925	

Normality Test

Have prior experience

H0: Easy navigations score are normally distributed.

H1: Easy navigation score are not normally distributed.

Since P = 0.0767239

0.0767239 > 0.05, We do not reject H0.

Easy navigations scores for students with prior experience are normally distributed.

Do not have prior expereince

H0: Easy navigations score are normally distributed.

H1: Easy navigation score are not normally distributed.

Since P = 0.1534479

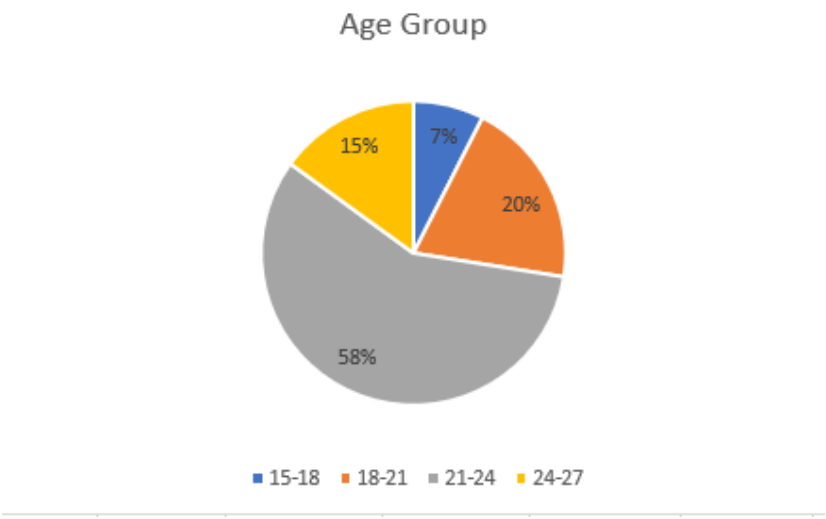
0.1534479 > 0.05, We do not reject H0.

Easy navigations scores for students without prior experience are normally distributed.

Since we do not reject H0 (P = 0.0767239), there is no significant association between easy navigation scores and prior expereience

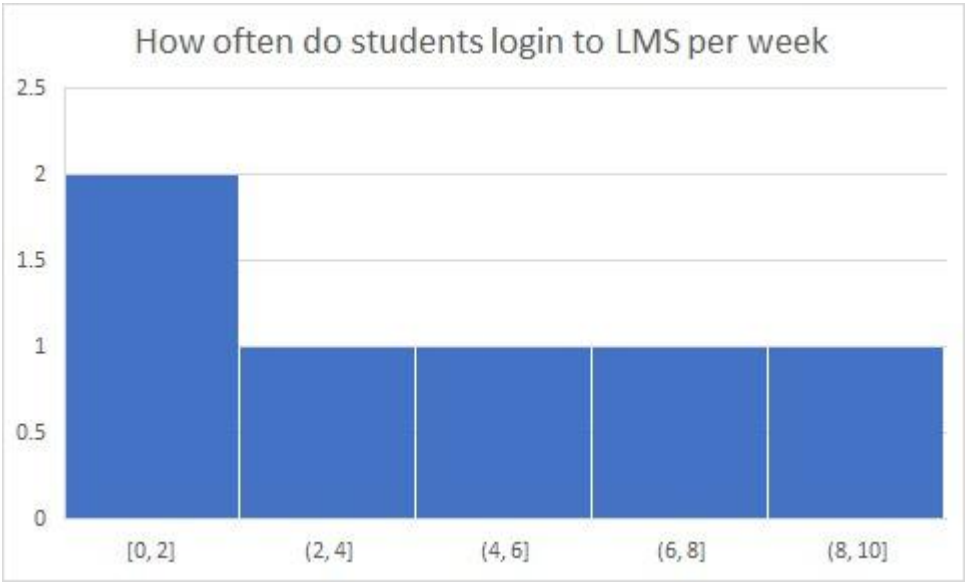
6. Graphs

6.1 Pie Chart



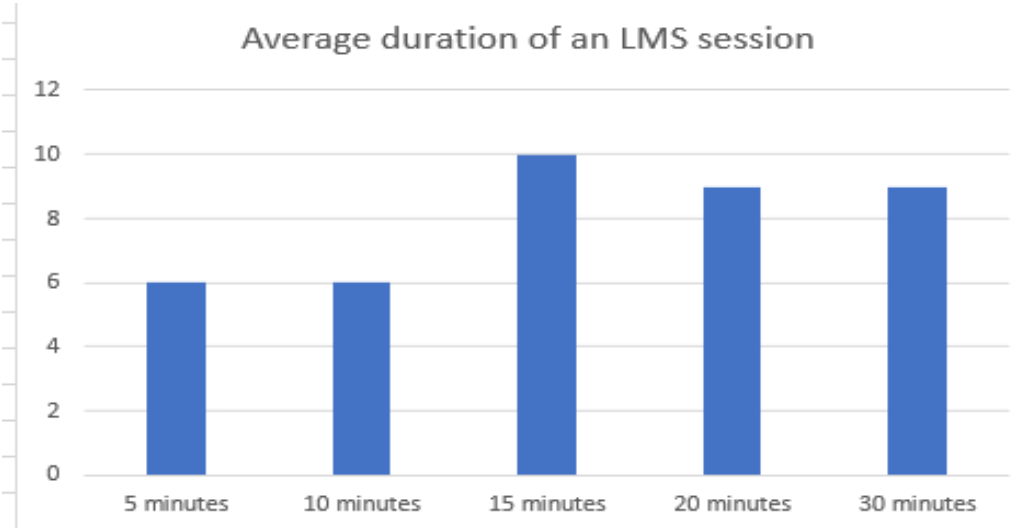
According to the above pie chart the majority are in the age group 21-24 which is 58%, and the lowest age group of the students who access LMS is 15-18 which is 7%.

6.2 Bar Chart



As the above bar chart depicts, the average duration most of the students engage on LMS is 15 minutes and it illustrates a balanced distribution across 5 minutes and 10 minutes.

6.3 Histogram



The above histogram illustrates the frequency distribution of the students who login into the NIBM LMS per week. The [0,2] bin shows the highest bar which shows the most students logging in to the LMS 0 - 2 times per week. We can predict that large number of students do not frequently access LMS.

7. Discussion

7.1 Key Findings

This research is about the main elements that affect the student's usage of LMS. The most frequent uses of this are assignment submitting, accessing lecture notes, and participation of group activities. Students access LMS multiple times within a week; most of them use mobile phones and laptops. Those with the highest levels of LMS engagement are youngers specifically categorized under 18-25 age group.

7.2 Challenges Identified

The effective usage of LMS is impeded by a number of issues. There are some errors reported by the students which are system failures, login issues and not being able to meet the deadlines. In addition to that some of them complained about the loading times, interfaces and navigation. There are some concerns about lack of AI support, security of data emphasizing that improvements are needed in the support service sector and user experience.

7.3 Recommendations

- Enhancing loading times for improved performance and increasing server capacity for smooth access it decreases system crashes also.
- Can make the LMS more user friendly by redeveloping, adding preferred features like dark mode, simplicity of navigation for easy accessing.
- Two factor authentication is a good strategy to enhance the security of data.
- Making sure the IT support sector is more attentive to technical difficulties and they can deploy an AI chatbot for quick support.
- According to students needs can provide via the app notification system, offline study material access and language reliability options.

8. Conclusion

This identifies the main determinants of NIBM LMS adoption, such as accessibility, technical difficulties and user experience. There are some main obstacles which are security concerns, navigational challenges and performance limitations. UI enhancements, performance effectiveness and better IT support were among the suggestions put forth to improve the LMS. Through these modifications the website will become more effective and user friendly. To satisfy students' changing requirements and enhance the educational process, ongoing assessment and improvements are crucial.

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