

State of the Art: Usability Test based on the Mobile Learning System (MLS) with help of System Usability Scale

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ABSTRACT: *The increasing prevalence of technology has had a significant impact on various domains of life, including education. In this context, the present study proposes the development and usability testing of a Mobile Learning System (MLS) application. The MLS is intended to revolutionize the traditional education system by integrating technology into the learning process, making it more accessible, enjoyable, and effective. The primary objective of the MLS is to allow students to learn at their own pace, anytime and anywhere, without any time or place restrictions. The proposed MLS application has been designed to facilitate access to educational material in the form of videos, images, and text, which in turn makes learning more interactive and engaging. The study aims to evaluate the usability of the MLS using the System Usability Scale (SUS). The survey will be conducted after the development and implementation of the MLS app, and will involve the participation of students who will be using the app. The results of the study are expected to contribute to the understanding of the usability and effectiveness of the MLS application in enhancing the learning experience of students. The proposed MLS application has the potential to transform the traditional education system by leveraging technology to provide students with a more flexible, accessible, and engaging learning experience. The findings of this study may have implications for the design and development of future mobile learning applications, as well as for the integration of technology in the field of education.*

Keywords: *System Usability Test (SUT), Mobile Learning system (MLS), System Usability Scale (SUS)*

I. INTRODUCTION

The performance of students is measured based on the points assigned to each task, which reflect the complexity of the task. The student's performance is evaluated based on the number of points earned, and the deadline for each task is taken into consideration. If a student completes the task within the given

deadline, it indicates active interest in their studies. Lack of interest is one of the major reasons for student failure or lack of attention in education. To enhance student interest, attention should be diverted towards an entertainment-based educational system, such as the proposed Mobile Learning System application. While this system is not a 100% solution, it may still be beneficial. To gain student attention, manual tasks will be assigned to students before assigning tasks on the Mobile Learning System. The difference between the traditional and computerized Mobile Learning System will be analyzed by conducting a survey among students.

Analysing Performance of Students using MLS Components

The performance of students is an essential aspect that needs to be analyzed to measure the effectiveness of the MLS. The performance of students is measured by assigning points to each task based on its complexity, and the student's performance is evaluated based on the number of points earned. The deadline for each task is also taken into consideration. If a student completes the task within the given deadline, it indicates active interest in their studies. The MLS has been developed using PHP, which is a popular programming language for web development. PHP is known for its flexibility, scalability, and robustness, making it an ideal choice for developing web applications. The use of PHP has enabled the MLS to be lightweight, fast, and user-friendly, making it easy for students to use.

Testing Usability of MLS using SUS

To test the usability of the MLS, the System Usability Scale (SUS) has been used. SUS is a reliable and widely used tool for evaluating the usability of software applications. It consists of ten questions, each with a five-point rating scale. The SUS score is calculated based on the responses to these ten questions. The SUS score ranges from 0 to 100, with higher scores indicating better usability. The integration of technology in education has transformed the traditional learning experience, and the proposed Mobile Learning System aims to further revolutionize the education system. The MLS has been designed to provide students with an interactive and engaging learning experience, enhancing their academic performance. The use of PHP has made the MLS lightweight, fast, and user-friendly, facilitating ease of use for students. The System Usability Scale has been used to test

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the usability of the MLS and provide valuable feedback to improve the application further.

What is a mobile learning system?

A mobile learning system is an application that integrates technology into the traditional learning experience, providing students with an interactive and engaging learning experience. The performance of students is evaluated using the MLS based on the points earned for each task and the deadline for completing the task. PHP is a popular programming language used for web development, and it is the language used for developing the MLS. PHP is known for its flexibility, scalability, and robustness, making it an ideal choice for developing web applications.

The Mobile Learning System word was originally given by an inventor and a programmer in 2022. He did not carry on his proposal, but it was not accomplished till 2010. The technique of Mobile Learning System is used for incorporating the social rewards by using the software. Before 20 years, the Mobile Learning System was introduced as a model T. The people in a business organization, as well as the stockholders, were busy in exploring the loyalty of the clients. More than 10 decades, the stockholders are looking for the latest techniques for encouraging the clients to buy the products that involve products.

In 1896, S & H Green stamps concept were used in the market. Marketers sold those stamps to retailers; they used to reward loyal customers. In 1973, Charles Conrad founded a consulting firm called "The Game of Work", where they merged sports activities into the workplace to provide fun to employees during work. In 2002 / 2003 Nick Pelling coins the concept of the term Mobile Learning System. In 2007, Bunch ball introduces Mobile Learning System techniques on the website. It receives over 8 million page views in only six weeks. In 2019, to adopt 6th class standard into the game-based learning environment. Mobile Learning System is rapidly used to many organizations to increase productivity. It was predicted in 2014 by M2 research that Mobile Learning System will be a 2.8-billion-dollar industry by 2016.

Usage of Mobile Learning System

The Mobile Learning System is commonly used. The usage of Mobile Learning System can be found in the large organizations for record-keeping of students. Moreover, this system is used for the encouragement of students while studying time to bring fun in the tasks. There are several tasks for implementation, some of them are very easier to implement and plan, to write the coding or technical expertise. Any business organization can use Mobile Learning System. Some of the Mobile Learning System applications.

- The Mobile Learning System in the US Army for Recruitment purpose
- Mobile Learning System for motivation and tracking the goals in Jillian Michaels
- Usage of Mobile Learning System for social loyalty and customer engagement in Samsung
- Mobile Learning System in tracking the goals and achievement of proofs in Tree House
- Mobile Learning System at Kaplan University for Education Purposess

II. LITERATURE REVIEW

Several types of research have been done in computer-human interaction field. Today, the Mobile Learning System if a burning topic. The researchers are busy in identifying in the latest was for implementing the Mobile Learning System usage in real-time applications for increasing the productivity for motivating the students in their studies. Hamadi *et al*, [1, 20] in 2014, have created Mobile Learning System architecture for testing the effects of Mobile Learning System by drawing from the definitions of Mobile Learning System as well as the affordance of motivations. The catalysis Mobile Learning System framework is also known as Mobile Learning System. The authors of the papers derived the functionality of Mobile Learning System from the framework of ontology. The authors proposed that the Mobile Learning System will be very beneficial for educational institutes if implemented. Gabriel JIPA and Irinej MARIN [2, 17, 18, 19] in 2014 analyzed the effects of Mobile Learning System in the technology at a conceptual level. The authors of the paper surveyed by using TAM and got positive results when applying Mobile Learning System on the place other technologies. Schober and Sofia [3, 12, 14, 16] in 2016 worked on Mobile Learning System that in engaging the employees to work by applying Mobile Learning System as compared to the manual work. The authors of the paper created a case study for the previous result and finalized that by the implementation of Mobile Learning System in every organization for making employees in more effective by comparing to Mobile Learning System. Ferenc Eros and Gabor Kallus [2, 11,13, 15] in 2014 presented a Mobile Learning System general model in the business organizations that are entertaining the people in the daily life routine. The authors gave a solution that will be software's further that will help the employees to work in their daily life.

Nora Al Madi and Waif Al Baladi [6, 26, 27, 28] in 2010 to 2016 worked on a case study of ABANA company, the functionality of their system was to encourage the customers for purchasing the products. After some period, they will do any strategy to award some gifts to customers. Wilson *et al.*, [10, 24, 25, 31] in 2015 to

2018 made a case study for model designing for getting positive results in the learning when Mobile Learning System applying. The authors made a case study for getting positive results by applying Mobile Learning System in learning. Johannes *et al.*, [11, 21, 22, 23] 2012 to 2022 made an online survey on the process of design. The system usability scale is used for sports evolution and case study. The authors of the paper focused on several traditional works such as shopping online, game playing, question/ answering and much more. The authors of the paper summarized that by the applying Mobile Learning System to the specific fields, the performance and the productivity can be increased. The performance of the students is measured using the points assigned to each task. The points are based on the complexity of the task, and the student's performance is evaluated based on the number of points earned. The deadline for each task is also taken into consideration. If a student completes the task within the given deadline, it means that they are taking an active interest in their studies.

Nicola Capuano and Richard King [36] in 2015 made an experience on Mobile Learning System based on emergency training. Authors calculated gamified results using the System Usability Scale (SUS). Siobhan O'Donovan [4, 37] in 2016 surveyed Mobile Learning System on the students at the university level students in the environment of learning. The authors named the Mobile Learning System as "brain hex survey". Moreover, the authors made a survey of 90 students on several college and university level students. The author found many positive results in the survey. Finally, the author summarized that by applying Mobile Learning System in education creates interests in the study. Daren Wilson *et al.*, [9] in December 2015 Created a case study for Mobile Learning System for online learning. The authors explored several Mobile Learning System models, and they proposed an online learning model. First, the authors focused on the design of application/ Website. The system can attract users.

III. METHODOLOGY

This chapter provides the methodology to apply Mobile Learning System in order to analyze the performance of students to any educational organization. To reach the goal, the following steps are required. The performance of the students is measured using the points assigned to each task. The points are based on the complexity of the task, and the student's performance is evaluated based on the number of points earned. The deadline for each task is also taken into consideration. If a student completes the task within the given deadline, it means that they are taking an active interest in their studies.

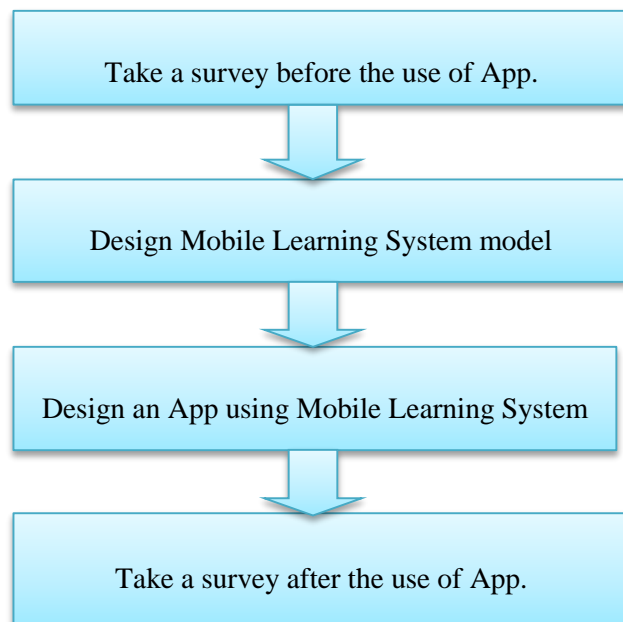


Figure. 3.1: Proposed Research Methodology

Figure 3.1: Mobile Learning System Model has all the required attributes which are related to increasing educational organization student's performance. Following is the Mobile Learning System model for improving students' performance.

Model of Mobile Learning System

One of the great Mobile Learning System frameworks is called Octa analysis Framework. Octa lysis is the general framework of the Mobile Learning System. It is based on predefined attributes; you can see the below figure-3.2 of Octa analysis Mobile Learning System.

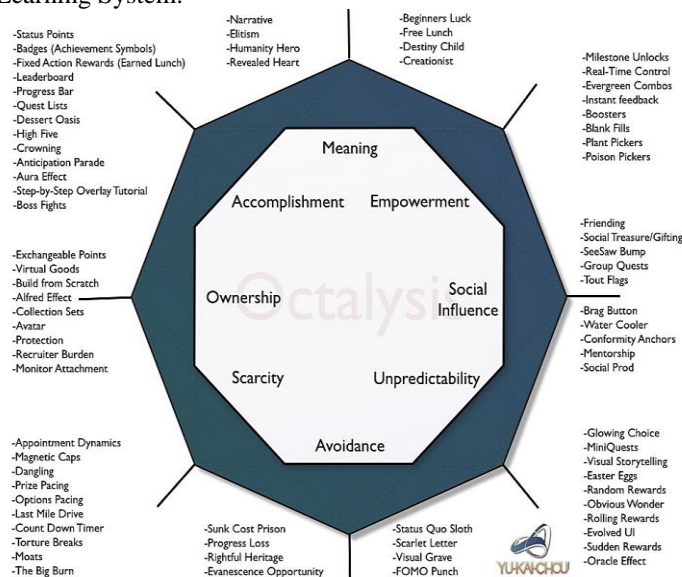


Figure 3.2: Octalysis Mobile Learning System Framework

Proposed Mobile Learning System Model

A Mobile Learning System model is a concept from general Mobile Learning System Octalysis framework. In this concept, we used the attributes that are related to the educational organization as per our app requirement. Since this research is on evaluating the performance of students', so the Mobile Learning System Model has all the required attributes which are related to increasing educational organization student's performance. Following is the Mobile Learning System model for improving students' performance.



Figure. 3.3: Proposed Mobile Learning System Model

Figure 3.3 some attributes are used from each core drive of Octalysis Mobile Learning System framework. The above attributes are related to measuring the performance of the students.

Flow of The App

There are three roles in this app, named Hood (head of the department), Teacher and Student. First, logins into the account. Figure 3.4 shows the login page of the app.

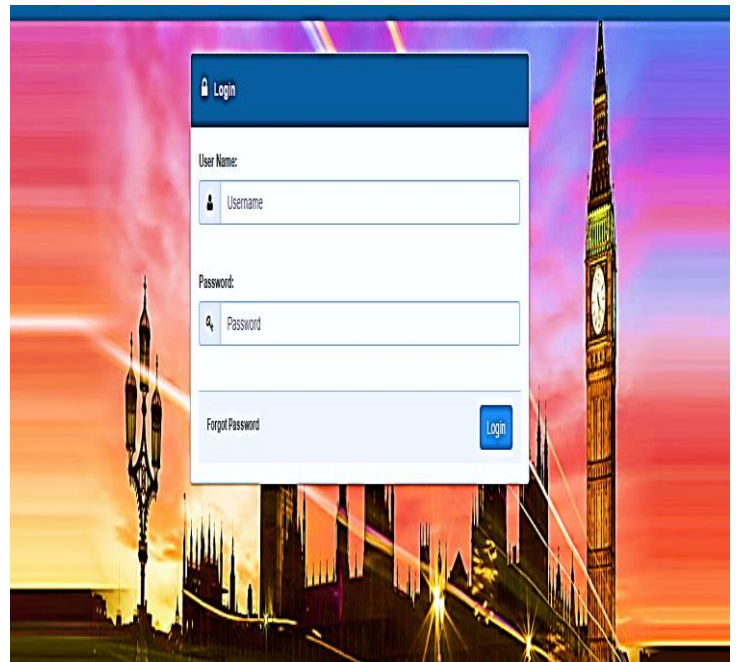


Figure. 3.4: Login Page

The user enters the username as well as password. When the user hits the login button, a home page would be opened. The home page consists of the overall report of all the students/class in the form of the graph as well as crystal report. When the teacher clicks on the assign task menu, the following page opens.

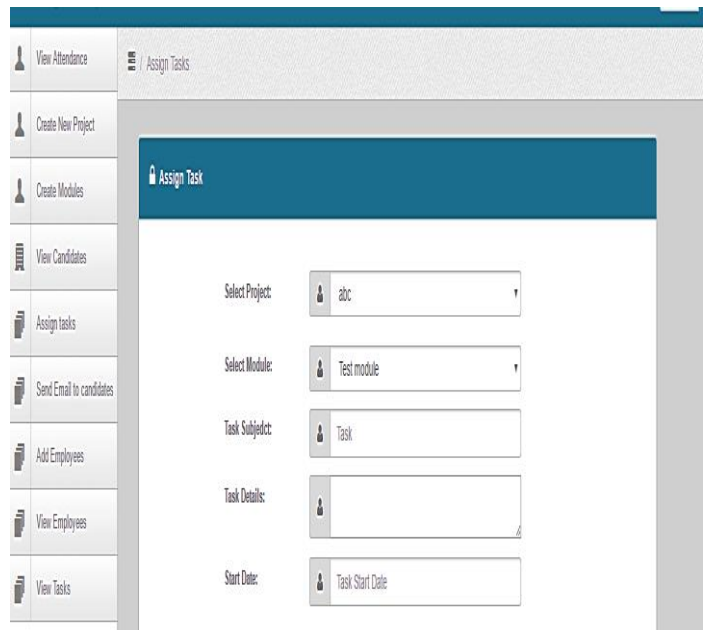


Figure. 3.5: Assign tasks

Figure 3.5 shows the task assignment page in the app. In 3.5, a teacher fills up all the fields regarding the assigning of the task. In this page, admin also assign deadline date to.



Figure. 3.6: Student View Tasks

The student during assigning of the task. This page contains Tasks list, modules list, task subject, task details, task completion date (deadline), list of students by whom a teacher wants to assign the task, task status (as there are four task status named as initiate, Complete, Incomplete and In Progress) When teacher assigns the task, its status is initiate but when a student starts work on the task, he / she changes the status from initiate to in progress so that teacher see which student is working on which task. Finally, the teacher specifies points against the given task and assigns the task to the student (student can be selected from the list of students from the drop-down list).

After assigning a task to students, the student login to their account and he / she sees the list of tasks along with completion date in a grid view. Figure 4.19 shows the student's tasks page in details.

Once the student sees all the tasks, he / she picks one task in which he / she wants to work on it. He / she clicks the edit button. After clicking the edit button, the student can only change the status of the task. Initially, the status would-be initiate. Student changes the status from initiate to in progress and starts work on it.

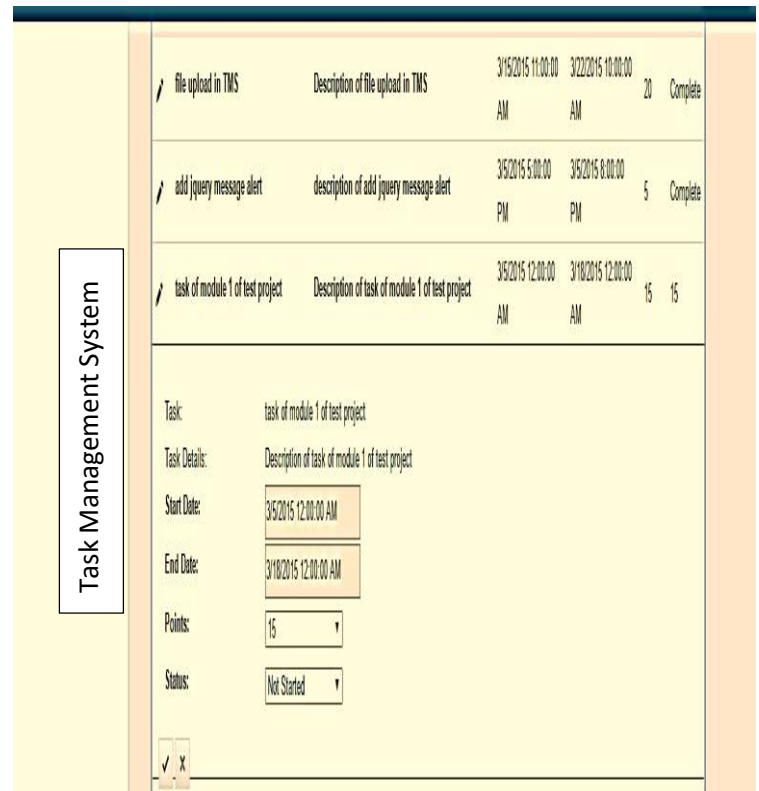


Figure. 3.7: Task in progress

Figure 3.7 shows student clicks edit button and then changes the task status from initiate to in progress. Finally, when the student completes the task, he / she once again click on the edit button of the corresponding task and then changes the status from in progress to complete. Once a student completes the task within the deadline, specified points would be added to the student's account.

Taking Survey

Finally, a survey has been conducted. The survey contains 10 System Usability Scale (SUS) Questionnaire. A survey is to be conducted among 50 students from education organization who are using this App. Finally, results have been analyzed to check whether the performance of students enhanced. Detailed results are provided in the next chapter.

IV. RESULTS AND DISCUSSION

This chapter includes analytic effects of Mobile Learning System. Students used an App called Task Management System, and then at the end of the month, a survey must be conducted from those students. The performance of the students is measured using the points assigned to each task. The points are based on the complexity of the task, and the student's performance is evaluated

based on the number of points earned. The deadline for each task is also taken into consideration. If a student completes the task within the given deadline, it means that they are taking an active interest in their studies. This chapter also shows the results that had been got after the survey.

Analysis of Effects of Mobile Learning System on Students' Performance

This section provides a comparative analysis of the effects of Mobile Learning System on students' performance. A survey is to be made to 50 students of different classes to analyze the performance of Mobile Learning System. The survey contained System Usability Questions (SUS). There are 10 standard SUS Questionnaire. On behalf of the SUS questionnaire, results to be analyzed.

Participants by Gender

The survey was to be taken from both the genders (i.e., male and female). Out of 50 participants, 43 were male participants and 7 were female participants.

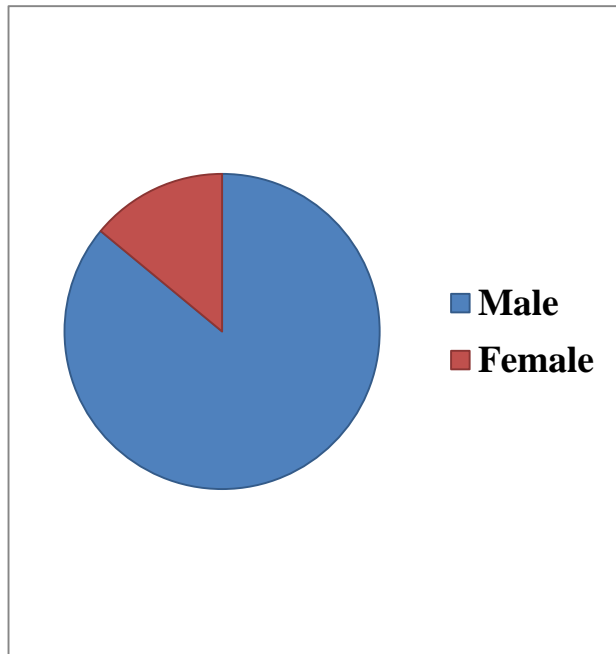


Figure. 4.1: Participants by gender

Education Level of Participants

Participants who filled the survey had different educational level. Figure 4.2 provides a graphical representation of different education levels of participants.

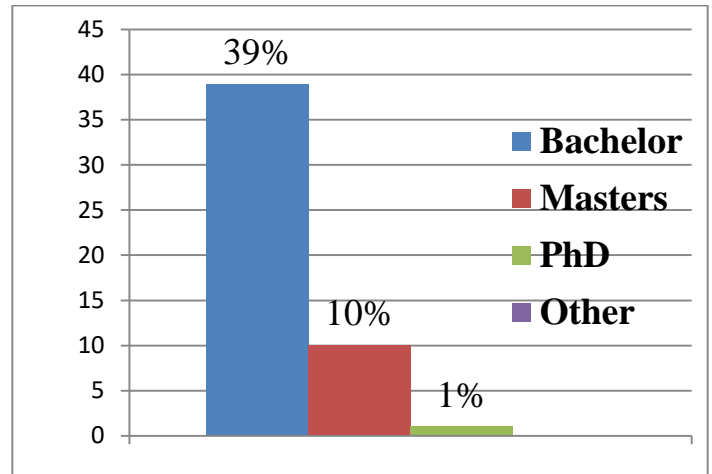


Figure. 4.2: Education levels of Participants

Figure 4.2 shows the education level of the participants. Out of 50, 39 were holding bachelor's degree, 10 were holding a master's degree and 1 was the Ph.D. holder.

Age Group of Participants

Participants having different age groups have participated in the survey. Figure 4.3 shows different age groups of participants.

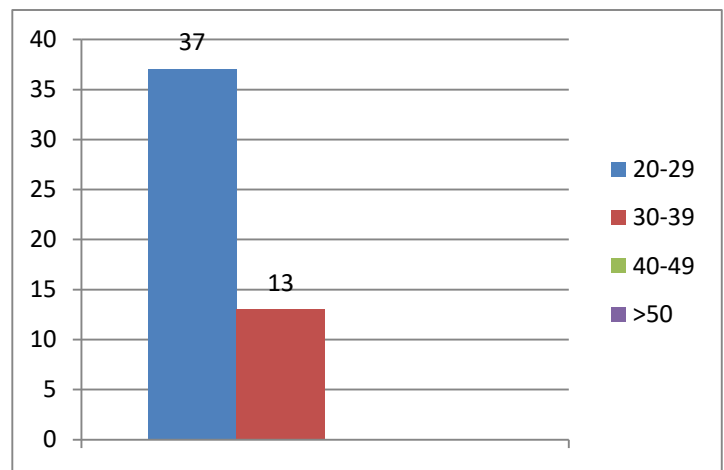


Figure. 4.3: Age group of Participants

Figure 4.3 shows that 37 were the participants whose ages were between 20 to 29 years, while 13 participants' ages ranges between 30 to 39 years.

As there are 10 System Usability Test (SUT) Questions in the questionnaire filled in the survey, so the following figures show an analysis of each question filled by participants in the survey. Results were made from a survey from out of 50 students. The first question from System Usability Scale (SUS) was: "I think

that I would like to use this system frequently". Figure 4.5 shows a graphical representation of the first question.

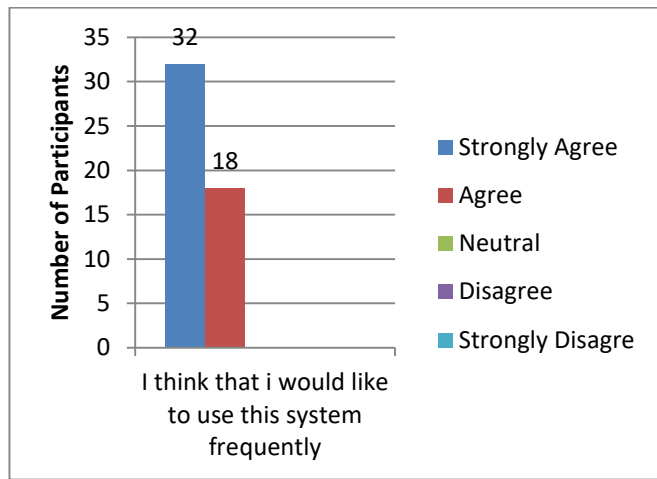


Figure .4.4: Frequent use of the system

Figure 4.4 shows a graphical representation of the first System Usability Scale (SUS) question. Out of 50, 32 students were strongly agreed and 18 were agreed. I mean students think this they will use the system frequently.

Next question from the System Usability Scale was "I found this system unnecessary complex". Figure 4.6 shows the graphical representation of the mentioned question.

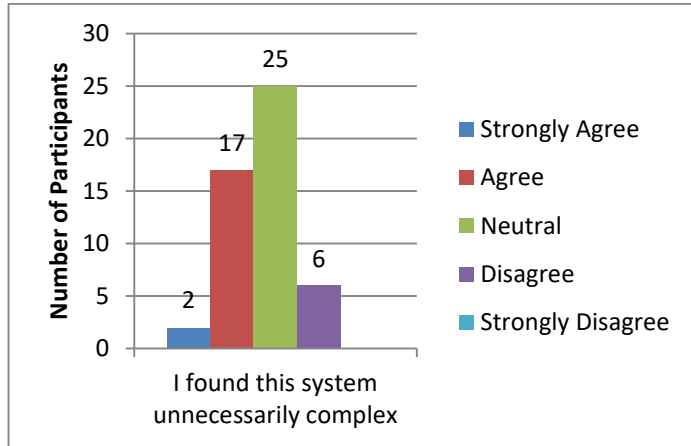


Figure. 4.5: Complexity of the system

Figure 4.5 shows 2 students out of 50 were strongly agree, 17 out of 50 agreed, 25 out of 50 were neutral and 6 out of 50 disagreed. It means most of the students found that the system / web application they are using is not much complex to use.

Next question is regarding the easiness of the use of the app. It was asked from the user / Participant that the system / app they

are using is easy to use or not. Figure 4.8 shows a graphical representation of the question.

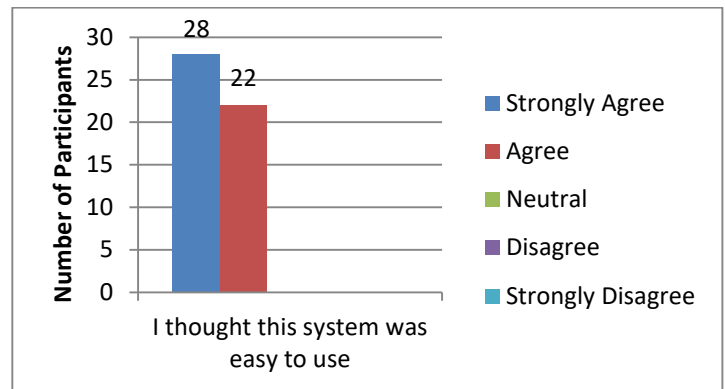


Figure 4.6: System is easy to use

Figure 4.6 shows the graphical representation of the question "I found this system easy to use". This question was asked from 50 students. Among 50, 22 students marked as strongly agree, 28 agreed, 0 were neutral, 0 disagreed and 0 strongly disagreed. It means that students who are using this system / app were agreed or happy for using this app.

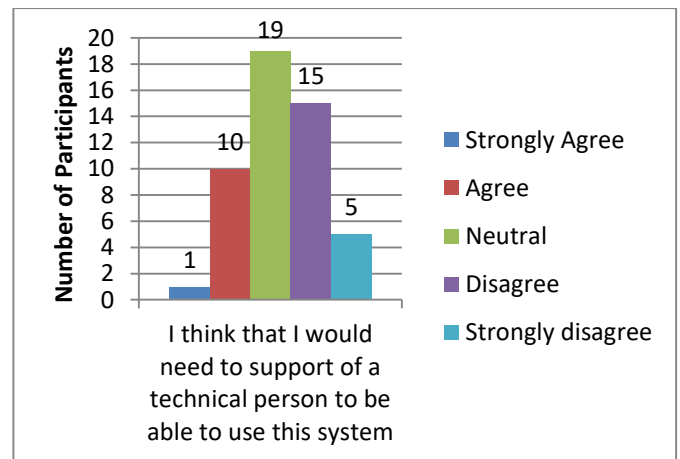


Figure 4.7: Need for a technical person

Figure 4.7 shows only 1 student needs the support of technical person while using Mobile Learning System app.

V. CONCLUSION

The integration of technology in education has transformed the traditional learning experience. The Mobile Learning System is a proposed application that aims to revolutionize the education system further. The MLS has been designed to provide students with an interactive and engaging learning experience, enhancing their academic performance. The use of PHP has made the MLS lightweight, fast, and user-friendly, making it easy for students to

use. The usability of the MLS has been tested using the System Usability Scale, providing valuable feedback to improve the application further. After developing and implementing the app, a survey is to be conducted to test the usability of the app using SUS (System Usability Scale). A survey is conducted among 50 students from the educational organization. All the students give positive response. It means students get interested while using Mobile Learning System app.

VI. FUTURE WORK

Furthermore, the effectiveness of this application (TMS) will be analyzed by the given responses of students conducting the survey. The effectiveness of Mobile Learning System will be analyzed by conducting the survey before and after the implementation of TMS.

REFERENCES

- [1] Juho Hamadi, Jonna Koivisto and Hari Sista. (2014). Does Mobile Learning System work? – A Literature Review of Empirical studies on Mobile Learning System.
- [2] Ferenc Erodes and Gabor Kallus. (2014). Benefit Evaluation Model for Gamified Add-ons in Business Software.
- [3] Schöbel, Sofia, University of Kassel, Kassel, Germany & Zolner, Matthias, University of St. Gallen, St. Gallen. (2016). How to gamify information systems- Adapting Mobile Learning System to individual preferences.
- [4] Siobhan O'Donovan. (2016). Mobile Learning System of the course of the game.
- [5] Gabriel Jia, Irinel Marin. (2014). Enterprise Mobile Learning System in Business to Consumer (B2C) Engagement Model.
- [6] Nora Al Madi and Waif Al Balawi (2015). A proposed framework for Measuring Enterprise Mobile Learning System Impact on Students/Employees' Performance: ABANA Enterprise Group Company Case Study.
- [7] Adrian Dominguez, Josefa Saenz-de-Navarrete, Luis de-Marcos, Luis Fernandez-Sanz, Carmen Pages, Jose Javier Martinez-Herreid. (2012). Gamifying learning experiences: Practical implication and outcomes.
- [8] Luis de-Marcos, Adrian Dominguez, Josefa Saenz-de-Navarrete, Carmen pages. (2014). An Empirical study comparing Mobile Learning System and social networking on e-learning.
- [9] Darren Wilson Colorado Technical University, Cynthia Calongne Colorado Technical University & S. Brook Henderson American Public University System. (2016). Mobile Learning System Challenges and a Case Study in Online Learning.
- [10] Kristina Knifing and Staff and Bjork. (2013). Mobile Learning System the Business of Fun. (Book)
- [11] Johannes Harms, Stefan Bieler, Christoph Wimmer, Karin Kappel and Thomas Richening (2015). Mobile Learning System of Online Survey: Design Process, Case Study and Evaluation.
- [12] Article on Octalysis. (2015). A complete Mobile Learning System framework (<http://yukaichou.com/Mobile Learning System-examples/catalysis-complete-MobileLearning System-framework/>).
- [13] S. Deterding, "Mobile Learning System: designing for motivation", *Interactions* 19, 4 July 2012, pp. 14-17
- [14] J. Anderson and L. Rainie, *The Future of Mobile Learning System*. Pew Research Center, May 2012.
- [15] J. Van Grove, "Mobile Learning System: How Competition Is Reinventing Business, Marketing & Everyday Life", *Mashable*, 28 July 2011.
- [16] M. Wu, "Mobile Learning System from a company of pro gamers" *Lithium Lithosphere*, 2011.
- [17] K. Salen and E. Zimmerman, *Rules of Play: Game Design Fundamentals*. Cambridge, Massachusetts: MIT Press, 2004.
- [18] J. Dormans. *Engineering Emergence: Applied Theory for Game Design*. Universiteit van Amsterdam, 2012.
- [19] E. Adams and J. Dormans, *Game Mechanics: Advanced Game Design*, New Riders Publishing, 2012.
- [20] B. K. Neeli, "A Method to Engage Employees Using Mobile Learning System in BPO Industry," *Proc. of 3rd Int. Conference on Services in Emerging Markets (ICSEM)*, 2012, pp. 142- 146.
- [21] S. Nikkila, et al., "Playing in Taskville: Designing a Social Game for the Workplace.", *CHI 2011 Workshop on Mobile Learning System: Using Game Design Elements in Non-game Contexts*, 2011.
- [22] R. Hunnicke, M. LeBlanc, and R. Zubek, "MDA: A Formal Approach to Game Design and Game Research", *Proc. of the Challenges in Game AI Workshop, 19th National Conference on Artificial Intelligence (AAAI '04)*. AAAI Press, 2004.

- [23] Bogost, I. "Persuasive Games: The Expressive Power of Videogames." (2007)
- [24] Cook, D. "What are game mechanics?". lostgarden.com, available online at <http://lostgarden.com/2006/10/what-are-game-mechanics.html> (accessed: 26/3/2008). (2006).
- [25] Fullerton, T., C. Swain, and S. Hoffman. *Game Design Workshop: Designing, Prototyping, and Playtesting Games*. Focal Pr, (2004).
- [26] Hamari, J., & Järvinen, A. Building Customer Relationship through Game Mechanics in Social Games. In M. Cruz-Cunha, V. Carvalho & P. Tavares (Eds.), *Business, Technological and Social Dimensions of Computer Games: Multidisciplinary Developments*. Hershey, PA: IGI Global (2011).
- [27] Kim, A. J. "Putting the Fun in Functional - applying game mechanics to functional software." (2008).Web.
- [28] Salen, K., and E. Zimmerman. *Rules of Play: Game Design Fundamentals*. MIT Press, (2004).
- [29] Decker, A., & Lawley, E. L. (2013). Life's a game and the game of life: how making a game out of it can change student behavior. In *Proceeding of the 44th ACM technical symposium on Computer Science Education* (pp. 233–238). Denver: ACM.
- [30] Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*. Philadelphia: Wharton Digital Press.
- [31] Amir, B. & Ralph, P. (2014). *Proposing a Theory of Mobile Learning System Effectiveness*, ICSE, Companion'14, May 31 – June 7, 2014, Hyderabad, India.
- [32] Aparicio, A.F., Vela, F.L.G., Sánchez, J.L.G., Montes J.L.I. (Oct3–5,2012). *Analysis and application of Mobile Learning System*, Interaccion'12, Elche, Alicante, Spain.
- [33] *Rethinking Mobile Learning System*, Edited Book by Fuchs M., Fiske S., Ruffino P., Scrape N. (2014). Meson Press, ISBN 978-3-95796-000-9
- [34] Herzig, P., Strainer, S., & Ambling, M. (2012). *Mobile Learning System of ERP Systems – Exploring Mobile Learning System Effects on User Acceptance Constructs*, Multicompetent Wirtschaftsinformatik.
- [35] Sucherman, G., Cunningham, C. (2011). *Mobile Learning System by Design: Implementing Game Mechanics in Web and Mobile Apps*, O'Reilly Media.
- [36] Nicola Capuano and Richard king. (2015). *Knowledge-Based Assessment in Serious Games: An experience of emergency training*.
- [37] Sarwar, A. L., & Humair Nawaz, Z. A. (2021). *Analysis Of Session Initiation Protocol With VoIP In Multimedia Conferencing System*. *International Journal*, 10(3)
- [38] Mughal, Z. A., Kaim, A., Ahmed, S. S., & Qazi, S. (2022). *Key Factors and Features Analysis of Popular SaaS ERP Systems for Adoptability*. *Journal of Software Engineering*, 1(1), 11-21.
- [39] Khani, M. A. K., Khan, A. A., Brohi, A. B., & Shaikh, Z. A. (2022). *Designing Mobile Learning Smart Education System Architecture for Big Data Management Using Fog Computing Technology*. *International Journal of Imaging and Sensing Technologies and Applications (IJISTA)*, 1(1), 1-23.
- [40] Khani, M. A. K., Brohi, A. B., Mughal, Z. A., & Affrah, S. A *MODEL DESIGN FOR SMART HOME SECURITY SYSTEM USING (IOT) WITH CCTV CAMERA*.