

The Study of UX on Students' Perception and Attitude of Using Zoom During Covid-19 Pandemic Using User Centered Design Method

Inacio Campos, Mira Kania Sabariah*, Danang Junaedi

Informatika, S1 Informatika, Telkom University, Bandung, Indonesia

Email: ¹inacio@student.telkomuniversity.ac.id, ^{2,*}mirakania@telkomuniversity.ac.id, ³danangjunaedi@telkomuniversity.ac.id

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Abstrak—Pandemi COVID-19 mengakibatkan penutupan fisik yang kini telah mengubah pendidikan menjadi model "pembelajaran online" eksklusif. Zoom digunakan untuk mengevaluasi kegunaan yang dirasakan sebagai platform referensi. Para siswa merasa kurang kolaboratif, kurang interaktif, membosankan, dan kurang kolaboratif. Dari perspektif ini, Kegunaan platform pembelajaran online saat ini merupakan faktor penting, terutama karena tidak ada kelas fisik yang hadir. User-Centered Design (UCD) dipilih untuk penelitian ini dan menggunakan metode Usability Scale (SUS) untuk mengevaluasi antarmuka. Tujuan dari penelitian ini adalah untuk menganalisis pengalaman pengguna, merancang solusi dan mengevaluasi antarmuka pengguna yang dapat memenuhi kebutuhan pengguna. Pra-survei untuk mengevaluasi kesulitan aplikasi Zoom berdasarkan pengalaman pengguna, dan pasca-survei untuk melihat apakah desain yang ditingkatkan dapat membantu siswa menggunakan aplikasi Zoom untuk pembelajaran online. Kemudian, gunakan pendekatan kuesioner System Usability Scale (SUS) untuk mengukur kegunaan sistem. Setelah pendekatan UCD selesai, peneliti melakukan survei lanjutan. Hasil penelitian menunjukkan bahwa peringkat SUS ke 85,12. Akibatnya, rentang penerimaan yang sebelumnya rendah telah dinaikkan menjadi dapat diterima. Selain itu, skala kelas telah direklasifikasi B. Program Zoom kini memiliki lebih banyak fitur dan lebih mudah digunakan serta memenuhi kebutuhan siswa.

Kata Kunci: Pembelajaran Online; Pengalaman Pengguna; Tampilan Antar Muka Pengguna; Skala Kegunaan Sistem; Covid-19

Abstract—The pandemic of COVID-19 resulted in the physical shutdown which has now transformed education into an exclusive "online learning" model. Zoom is being used to evaluate the perceived usability as the reference platform. The students find it less collaborative, less interactive, boring, and less collaborative. From this perspective, the Usability of the current online learning platforms is an important factor, particularly because no physical classes are present. The User-Centered Design (UCD) approach was chosen for this study and using the Usability Scale (SUS) method to evaluate the interface. The objective of this study is to analyze user experience, design solutions and evaluate user interfaces that can meet user needs. A pre-survey to evaluate the difficulties of the Zoom application based on user experience, and a post-survey to see if the upgraded design can help the students using the Zoom application for online learning. Then, use the System Usability Scale (SUS) questionnaire approach to measure the system's usability. After the UCD approach was completed, the researcher did a follow-up survey. The results showed that SUS ratings went up to 85.12. As a result, the previously low acceptability ranges have been raised to acceptable. Additionally, the grade scale has been reclassified B. The Zoom program now has more features and is easier to use, and fulfills the students' needs.

Keywords: Online Learning; User Experience; User Interface; System Usability Scale; Covid-19

1. INTRODUCTION

The pandemic of COVID-19 forced educational institutions to move from traditional face-to-face to eLearning. eLearning is construed in a variety of contexts, such as distance learning, online learning, and networked learning [1]. For teachers and students, this transition brought with it a new education environment. Teachers faced several challenges, including the new evaluation techniques to be adopted, the development of an interactive eLearning environment, and the design of educational materials that fit into a new environment. For the students, there are many aspects to consider for interactive, collaborative, and efficient learning, from the user interface to the eLearning resources and the learning process.

A typical eLearning definition refers to technological platform that facilitates learning environment for students at their own pace and time through network services like, live chats among groups of students and teachers, online assignments, online answers and questions method, discussion boards, and email support [2]. Ideal eLearning tools must have the capabilities to help the student and the teachers finish their task easily, as they must design the learning experience to help students engage with the knowledge and skills. This means that the teaching tools create for academics must embody the experience of what works for the learner, and must be easy for academics to use [3]. The excellent tool for eLearning should have a function that allows students to learn and remain active and helps them evaluate their performance in the classroom. When an activity is complete, learners reflect on their performance and evaluate the learning process and outcome [4].

After surveying Telkom University students, I discovered that Zoom is the most commonly used tool for virtual class meetings during online learning. Zoom is the most commonly used tool in the learning process, with a percentage of 78.9%, according to the survey's 48 participants, with the remaining 15.8% using Microsoft Teams and 5.3% using Google Meet. Zoom was the choice for many government agencies, universities, non-profit organizations, and individuals. Zoom, was founded by Eric Yuan in 2011 [5]. Zoom offer high-quality audio, video, and screen-sharing capabilities make it ideal for online lectures, virtual conferences, webinars, and other events.

Despite the fact that Zoom covers general classroom activities such as meetings and explanations, students continue to experience less interaction between student and teacher in the functionalities of eLearning tools such as video conferencing and web-based conferencing Zoom due to a number of issues raised by students such as no absent feature, no quiz feature, lack of collaboration between the students in the meeting, internet problems, less engagement in the classroom, etc. Students suggested that the tool include more specific functionalities that represent the traditional classroom, as well as some features that can make the learning process more appealing and engaging. Most students prefer classroom to online learning and according to them, distance learning cannot replace the classroom environment [6].

The study focuses on UX research in interactive online e-learning, where teachers and students are simultaneously interconnected with technology, the Internet, and educational applications using in the learning process and provides recommendations for improvement of eLearning tools currently using for online learning. In addition, this study will also help students to improve their learning skills in computerized learning environments in the future. As a matter of fact, sometimes users judge and create UX about any product before even touching them. Interests in UX has spread out all over domains, including an education field [7]. Indeed, the quality of eLearning tools affects the learning performances of students during their online learning.

The User-Centered Design (UCD) Method was chosen for this study because, in the UCD approach, users are directly involved as an important thing major over the development of the system. ‘User-centered design’ (UCD) is a broad term to describe design processes in which end-users influence how a design takes shape [8]. The best results from this research will then be used as the primary data in the process of creating the best interface design of the learning tool.

The purpose of this study is to investigate user experience (UX) in online interactive e-learning. Explore the User Experience of students towards using Zoom in online learning using Human-Centered Design, design a solution based on the result of the user experience analysis result, and use the System Usability Scale (SUS) method to evaluate the proposed model to meet the user requirement.

2. RESEARCH METHODOLOGY

2.1 Literature Review

2.1.1. Zoom (Software)

Zoom is a web-based video conferencing tool with a local, desktop client and a mobile app that allows users to meet online, with or without video. Zoom users can choose to record sessions, collaborate on projects, and share or annotate on one another’s screens, all with one easy-to-use platform.

2.1.2. User Experience (UX) and User Interface (UI)

User experience (UX) as a field seeks to offer a systematic approach to design and analysis of the user’s holistic experiences with the technology. UX refers to users’ perceptions and responses that arise in the use of an interactive system [9]. User interface (UI) design is the process designers use to build interfaces in software or computerized devices, focusing on looks or style. Designers aim to create interfaces which users find easy to use and pleasurable.

2.1.3. User-Centered Design (UCD)

User-centered design (UCD) is an iterative design process in which designers focus on the users and their needs in each phase of the design process. In UCD, design teams involve users throughout the design process via a variety of research and design techniques, to create highly usable and accessible products for them.

2.1.4. System Usability Scale (SUS)

From Usability.gov, the System Usability Scale (SUS) provides a “quick and dirty”, reliable tool for measuring the usability. It consists of a 10 item questionnaire with five response options for respondents; from Strongly agree to Strongly disagree. Originally created by John Brooke in 1986, it allows to evaluate a wide variety of products and services, including hardware, software, mobile devices, websites and applications. When a SUS is used, participants should score the following 10 items with 1 of 5 answers ranging from Strongly Agree to Strongly disagree:

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.

10. I needed to learn a lot of things before I could get going with this system.

2.1.5. Online Survey

An online survey is a structured questionnaire that the target audience completes over the internet generally through a filling out a form. Online surveys can vary in length and format. The data is stored in a database and the survey tool generally provides some level of analysis of the data in addition to review by a trained expert.

2.2 System Built

The following is the modeling flow depicted in figure 1. These are phases that can be represented as a plot of research to solve previously defined problems. The process broke up into five stages and these stages of method based on User Centered Design (UCD) in this study: Understand the Context of Use, Specify Requirements, Create Design Solution, and Evaluate Design.

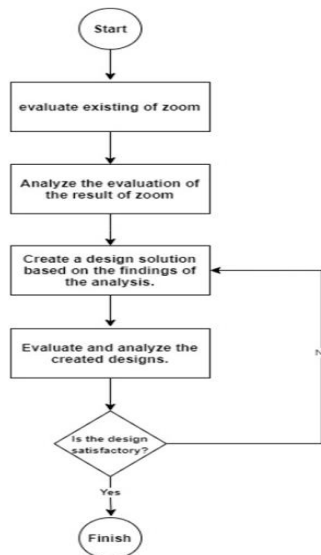


Figure 1. User-centered Design Process

In general, the iteration of the UCD technique consists of four separate steps as shown in Figure 1. First, designers aim to understand the context in which consumers may utilize a system, Then, identify and specify the requirements of the users. A design phase follows, during which the design team creates solutions. To determine how well a design performs, we evaluate the results of the evaluation in the context and requirements of the users.

2.3 Evaluate Existing of Zoom

In this stage, the author will conduct an interview or questionnaire as a process to identify the users who are going to use this product, for what they are going to use it and under what conditions. The purpose of this process is to identify the user's needs.

1. Participant

Following the User-Centered Design methodology at the Plan the Human-Centered Design stage, the participants in this study used the Zoom application during online classes, allowing them to provide more accurate feedback based on their personal experiences. Participants in this study are undergraduate students from several faculties at Telkom University who are between the ages of 18 and 25 and come from a variety of backgrounds

2. Method of Collecting Data

The data for this analysis was collected using three methods: Questionnaire, interview.

a. Questionnaire

The Students of Telkom University are selected respondents to answer a list of questions and indicate the degree of agreement or disagreement with the statement on a 5 (or 7) point scale. The author gives a questionnaire with 10 questions that are based on the System Usability Scale (SUS) to multiple users around 30 students. The System Usability Scale (SUS) is a simple, ten-item scale giving a global view of subjective assessments of usability [10]. The results of this questionnaire are presented in the form of numerical scores that will be used as a result of later analysis.

b. Interview

The author will conduct online interviews with several students who have been using Zoom for online classes during pandemic of Covid-19 to gather information for the study. The form of the interview that was utilized was semi-structured, in which questions were prepared ahead of time but were not always asked in order as listed. The

purpose of this interview is to gather information about the user's experience and satisfaction on using Zoom during online class.

2.4 Analysis of the Result

At this stage, the author completed their evaluation of the current conditions of the Zoom application. The author conducted an analysis based on feedback received from participants through a questionnaire and interviews. After collecting data from questionnaires and interviews about the current conditions of the Zoom app, which according to [11] is necessary to get a good understanding of what users need, at least 4-5 people from each age group should be used in the survey so that the information is more effective. As soon as all of the data has been gathered, it will be put together into a persona portfolio, and the author Specify the Users requirements. The author will conduct an analysis and look over the evaluation outcomes that have already been completed. In this article, the author lists individuals who use the Zoom program. This process will clarify what the users intend to use the Zoom application for and under what condition they intend to use it. This process will be done following the User-Centered Design approach at the Specify the Context of Use step. SUS will be used to measure the results of a questionnaire sent to several responders. Questionnaires are used to collect data about the Zoom application's performance and satisfaction. The results of each respondent's scores are calculated to obtain the result of the evaluation. When results fall below 68, according to [12], it's safe to assume that the Zoom application still has a lot of room for improvement. In addition, the interview results, which include qualitative data, are usually processed first. However, qualitative analysis still uses words and does not use mathematical or statistical calculations as analytical tools. Thus, the interview results use data analysis techniques to include transcripts of the interview results.

2.5 Create Design Solution

After performing the necessary analysis, the author will create a design solution in this following phase. Recommendations for usability improvements are provided once usability issues have been identified. The process involves creating the low-fidelity and high-fidelity design. Low fidelity will have simple visuals and content that will be mostly static. The goal of making low-fidelity wireframes is to figure out how the shell, basic architecture information, and screens work together. In the following step, the author will construct a High-Fidelity Prototype using the Figma program. Using a high-fidelity prototype, the author can show off the design ideas in a variety of ways, including color. This stage allows users to see how the product will work through a mockup that illustrates the overall design and operation of the system. The results of the user requirements analysis in the previous phase are used to guide the creation of the user interface. The design solution is presented to the target users for evaluation, and repetition of creating the solution may occur if the users are dissatisfied with the design solution. To get the optimum results, repetition may be necessary up to five times. As a critical component of the application, the repair must be given the highest consideration.

2.6 Evaluate the Design

After the user interface has been developed the following step is the *Design Evaluation* against user requirements to assess whether the design is consistent with user requirements. In the form of the System Usability Scale (SUS), participants who have been participating in the evaluation of the Zoom application will be given Usability Testing from the improvised Zoom application. The test results will be analyzed, whether or not the design has been designed to match user requirements. System Usability Scale: John Brooke invented the term "System Usability Scale" in 1986. Ten questions are included in this questionnaire to provide an overall picture of the user experience from a usability standpoint. According to users' needs and desires, the prototype's usability value will be determined by its SUS rating.

The rules to calculate SUS is first sum the score contributions from each item. Each item's score contribution will range from 0 to 4. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. For items 2,4,6,8 and 10, the contribution is 5 minus the scale position. Multiply the sum of the scores by 2.5 to obtain the overall value of SU [12]. Figure 2 explained that SUS scores have a range of 0 to 100 [13], and a score of 68 is considered to be the average for the SUS. When the SUS score is greater than 68, it is reasonable to assume that the user is pleased with their experience. In addition to that, the percentile rank score was assigned a grade of C. System Usability Scale (SUS) is a cheap and effective tool for assessing the usefulness of a product [14].

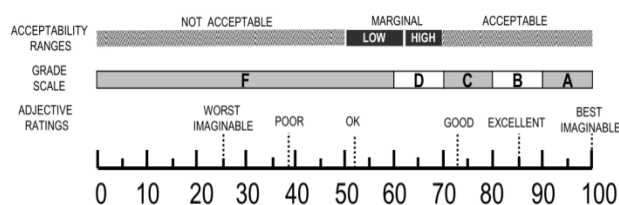


Figure 2. SUS Result Determination [9]

3. RESULT AND DISCUSSION

3.1 Pre-survey

At the first test result stage, the author surveyed 30 students who used Zoom in their online class using online survey method to discover their thoughts and perspectives on using Zoom application as a tool for online learning. The result of the survey in the Table 1 found that the students have a wide range of experiences and opinions. It found that only 13% of students enjoy using Zoom for online classes as shown in the Fig. 3; Table 1 displays the rest of the students find it less collaborative, less interactive, and boring.

Table 1. Pre survey

User Experience	Points
Bad	8
Less Interaction	9
Boring	8
Less engagement	3
Good	5
Less collaboration	4

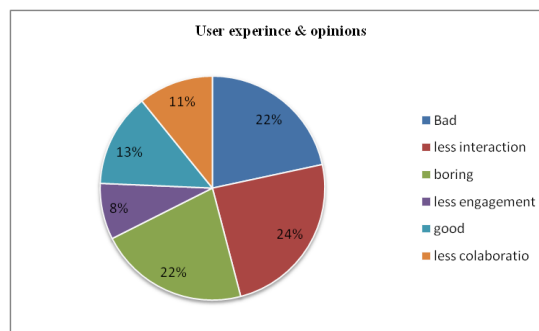


Figure 3. User Experience and Opinions

According to the findings shows in Table 1, the overall usability of the Zoom applications for students in the process of learning virtually is still quite poor and needs to be enhanced. Afterwards, the method of User-Centered Design will be utilized to perform improvisation in order to satisfy the User need. The pre-survey on user satisfaction with Zoom for online learning is unsatisfactory.

Table 2. User satisfaction

Tools	Satisfied	Somewhat satisfied	Neither satisfied or dissatisfied	Somewhat dissatisfied	Dissatisfied
Zoom	0	1	3	6	20

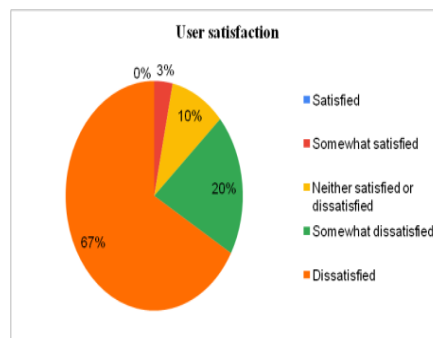


Figure 4. User Satisfaction

With the online survey, we conduct a user satisfaction survey, which is a questionnaire that measures the users' level of satisfaction with the Zoom application as shown in table 3 from satisfied to dissatisfied. In order to better understand their users' needs and problems, we can use satisfaction surveys to track changes in users' perceptions over time. Table 2 shows that users are dissatisfied with using Zoom for online classes because it is less collaborative and uninteresting, as explained in Table 1 by students' thoughts and perspectives on using Zoom for online learning. figure 4 depicts the overall result. According to the responses of the 30 users, 67 percent of the users are dissatisfied, implying that the majority of the students are dissatisfied with the Zoom application.

3.2 Understand the Context of Use

Students who study virtually are among the Zoom application's users. Furthermore, this study only focuses on using Zoom for class meetings or virtual learning processes, as well as the scope of a user interface, with respondents limited to a group of students who use Zoom for their online classes. Zoom is used by the students for learning, sharing, collaboration, and idea sharing. Zoom supports remote and hybrid learning environments in elementary, secondary, and higher education.

3.3 Specify User Requirements

The interview method is used to conduct the specification stage of user demands, and three users are chosen from the 30 respondents who participated in the initial evaluation stage of the project. Considering that they experience limitations when using the Zoom application for an online class, they are expected to provide suggestions and input for the next stage of Zoom application improvement. From the interview result shown in Table 3, we specify the user requirement and user's needs.

Table 3. Interview result

Respondents	User Requirements	User Needs
R1	Because there is less interaction between the student and the teacher when using the Zoom application, the learning process is a little boring. I believe there is still room for improvement in order to meet the needs of the students. such as making Q&A sessions to make the student more participate.	More interactive and fun classes that make all students participate in Q&A sessions.
R2	The Zoom application is not capable of helping students to be more active in class. Therefore, the teacher may only ask questions to a small number of the students, and the majority of the students may not be participating in the class.	More participation in class, all students must answer the questions from the teacher.
R3	There is less collaboration between students, and When a teacher gives an exam, we must use other tools instead of Zoom.	More collaboration between students, do the exam inside the zoom application

3.4 Produce Design Solution

After completing the previous processes, the author may now build a design solution that will be implemented to enhance the usability of this Zoom application. In developing a design solution, we will divide it into two categories:

- a. Low Fidelity: it's a great approach to get an idea of how a product will work, interact with users, and look at its overall structure before spending time and money on a high-fidelity prototype or design. [15].
- b. High Fidelity: the high-fidelity design focuses on specifics, branding, and a comprehensive layout. What started as a simple website wireframe turns into a fully designed page with color, typography, images, and interactivity [16].

Following the completion of both design solutions, as shown in Figure 5 and Figure. 6, we will proceed to the evaluation stage to ensure that the design improvements are appropriate and increase the usability value of the Zoom application.

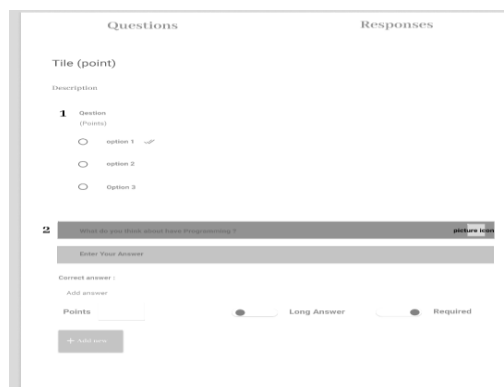


Figure 5. Low-fidelity Design

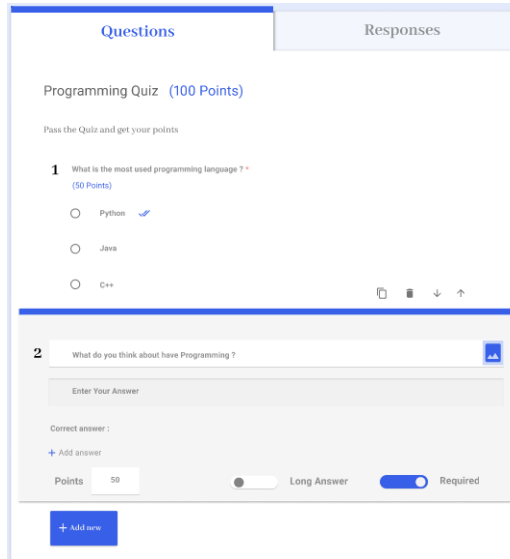


Figure 6. High-fidelity Design

3.5 Improve Design Solution

After carrying out the preliminary survey and obtaining a SUS score, it can be noted that the result of the SUS score acquired is still relatively low. As a result, we create design changes based on feedback from previous respondents to make the Zoom application easier to use. The complete enhancement can be found at <http://bitly.ws/sVHt>. During these unprecedented times, Zoom has become a popular platform for online teachers and students. For this, Teachers can maintain communication with their classes not only through video chats but also through the distribution of assignments. It is beneficial for the students and teachers to have a multifunctional platform to adapt to online learning. As a result, we created the assignment feature to address the lack of interaction during the online class. The Assignments and Grades capabilities of Zoom for Education enable teachers to assign students with assignments, tasks, or quizzes. A teacher can control assignment due dates, instructions, submission resources, and more. On the Grades tab, they may also track class and individual student progress. In addition, here are the main pages that have been designed by the application of UCD:

1. Assignment page:

The teacher can use this assignment page by clicking on the assignment button shown in Figure. 5 to assess the students' knowledge or skills in a specific subject. It was designed to emphasize the class examination, which is given during class. The assignment page includes additional useful features such as:

- Add Instruction: for the student to work on their task. The teacher may write in the assignment or upload a prepared file for the assignment.
- Due Date: the teacher can set a deadline for students to complete their assignment.
- Assign Task: optionally assign task to all students or only assign to a specific group of students.

2. Quiz page:

A teacher can distribute a Forms quiz to a group of students. Without leaving Zoom, students can participate in quizzes and teachers can grade their responses. To add a new question to your form, click the Add new button. Choose what type of question you want to add, such as Choice and Text.

3. Grading:

Grades make it easy to track student progress and access grades. Assignments are listed in the order of their due date.

- Turned in: the assignment has been turned in by the student, and the work is ready for grading.
- Not turned in: the student did not turn in the assignment.
- Returned or points: after grading student work, the points assigned will be displayed. If the assignment does not have any points, you will see "Returned."

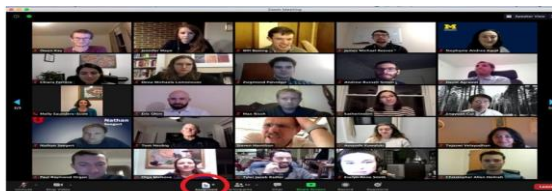


Figure 7. New Feature Assignment Button Location

1. The full prototype of the new Assignment feature design from a teacher point of view can be accessed in this link rb.gy/gtervq.
2. The full prototype of the new Assignment feature design from a student point of view can be accessed in this link rb.gy/eabn34.

3.6 Final Test Result

The final test result stage is the same as the pre-survey stage, with the initial survey using the System Usability Scale (SUS) questionnaire. This SUS questionnaire will be distributed to the same 30 respondents as the initial pre-survey respondents. Respondents must test the prototype Zoom application developed using the User-Centered Design (UCD) method before completing the SUS questionnaire. Table 6 displays the results of the respondents' responses.

According to the findings of the final usability test displayed in Table 4 that was conducted after enhancements, the overall total score of SUS is 85.91, which comprises a Grade B and an Acceptability Grade of Acceptable and Excellent. This means that after improving zoom by implementing the quiz and assignment features, students are more satisfied with the application because they can now complete the quiz and assignment within the zoom application. This is a significant advantage for Zoom to become more engaged and interactive. With powerful features like assignment and grading in Zoom, the virtual study will be made easier for both the student and the teacher.

Table 4. Pre survey

Respondent	SUS Raw Score	SUS Final score
1	32 x 2,5	80
2	33 x 2,5	82,5
3	33 x 2,5	82,5
4	35 x 2,5	87,5
5	38 x 2,5	95
6	38 x 2,5	95
7	34 x 2,5	85
8	35 x 2,5	87,5
9	33 x 2,5	82,5
10	37 x 2,5	92,5
11	36 x 2,5	90
12	38 x 2,5	95
13	27 x 2,5	67,5
14	38 x 2,5	95
15	36 x 2,5	90
16	35 x 2,5	87,5
17	35 x 2,5	87,5
18	38 x 2,5	95
19	36 x 2,5	90
20	32 x 2,5	80
21	39 x 2,5	97,5
22	20 x 2,5	50
23	37 x 2,5	92,5
24	33 x 2,5	82,5
25	36 x 2,5	90
26	34 x 2,5	85
27	36 x 2,5	90
28	38 x 2,5	95
29	24 x 2,5	60
30	35 x 2,5	87,5
Average		85,91

4. CONCLUSION

Based on the results of the preliminary and final surveys, which were done using the UCD technique had been used to make adjustments. The final survey result has a score of 85.91, The value obtained becomes acceptable after the final evaluation and improvement in the UI in this Zoom application because the score obtained is greater than 73. Before evaluation and improvement, the grade scale level is classified as D because the score is less than 68. The SUS score obtained after evaluating and improving the grade scale level is in category B at 80 and above. The main issue discovered through observations, interviews, and questionnaires used to evaluate usability in Zoom

applications is that the application has fewer features or functionality to meet the needs of students taking online classes, so it does not meet user needs. Before the improvement, students had difficulty using the Zoom application in class to increase interaction, collaboration, and engagement in the class. As a result of using the user-centered design method, the Zoom program now has more features and is easier to use. Most importantly, it fulfills the students' needs. A new survey found that the acceptability ranges 85.91, which is a significant improvement over the pre-survey. The Grade scale is B. The application is now more interactive and collaborative in the learning process, which was the goal. The teacher can now assign all of the questions to all of the students using the quiz feature, and it does a good job of assigning exams to the students, allowing them to participate more actively in class. Furthermore, because it has more functionality to complete the learning process during remote learning, it will encourage more users to use the application of their online classes. Although Zoom usability scores have improved, they can be improved in future research. Due to limited user information, further research is needed, especially on observation to discover how Zoom is used in virtual learning. Further examination and improvement are needed to earn the highest score in each category.

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