Usability Evaluation of Class Enrolment Application for University Students

Vivi Triyanti[1], Hotma Antoni Hutahaean[2], Marsela Gracia[3]
{vivi.triyanti@atmajaya.ac.id[1], hotma.hutahaean@atmajaya.ac.id[2], marselagracia@gmail.com [3]}

Industrial Engineering Department, Atma Jaya Catholic University of Indonesia, Indonesia[1,2,3]

Abstract. Online class enrolment is a periodically routine activity for every student at University X. Some users feel that the application is quite confusing, especially in terms of the enrolment process. The purpose of this study is to measure the usability of the enrolment process in the class enrollment module. Usability testing was conducted to measure the time and errors in carrying out the "Add-Class" and "Delete-Class" scenarios, divided into four steps. A questionnaire using Nielsen attributes was also conducted to measure aspects of learnability, efficiency, memorability, errors, and pleasure. Difficulties occurred, especially when inputting courses. Some students finally gave up because they did not understand what to do next. The usability score also only showed average results, with the lowest score in the Efficiency aspect. Improvements to the application must be made, especially in the step of adding courses, to improve the positive experience of students as users.

Keywords: Usability testing, Nielsen attributes, class enrolment

1   Introduction

Class enrolment is usually a periodic routine of every university student. The enrolment process is usually done online using a special application. Therefore, the application should be easily accessible and usable to students [1]. Students at University X conduct various academic tasks, including course registration (KRS), adding courses, paying for class enrollment, and reviewing class schedules on the education application called Application Y.

 Usability is crucial to guarantee that people can engage with the application efficiently. Among the major factors in the success of a website in the educational sector is interface usability [2]. Usability is, according to the ISO 9241-11 standard, the degree to which a product may be utilized by certain users to accomplish specific goals with efficiency and satisfaction [3]. Thus, usability and user experience go hand in hand because they are both centered on the opinions and satisfaction of the users. How a user interacts with a website or application will matter because, in essence, this directly influences their pleasure and how well they can use it to acquire academic services. Usability, aesthetics, design, speed, and categorization are some of the metrics that influence user satisfaction [4].

Based on a preliminary study, students frequently find difficulties using the class enrolment application modules. This indicates that the application might have low usability. Therefore, it is important to analyze the usability of the class enrolment application. By analyzing the usability, it is expected that in the future, users won't encounter any challenges in applying the application.

The main goal of this study is to find out the usability of the class enrollment module of the student application that was used by University X. Due to certain limitations, we cannot use the real application for the usability testing. Therefore, for this research, we created and used a special application that simulated the scenario of addition and deletion of classes. The dummy application is similar to the real one, both in the display and the procedure of usage.

2 Literature Study

Usability is the most important element in designing and judging the website, which determines the quality of user interaction with it in attaining their goals. The usefulness aspect contains some parts all over: ease of use, efficiency, learnability and memorability, error tolerance, and user satisfaction. These factors are very important for figuring out the general user experience and can have a big effect on how well a website does.

One of the basic ideas behind usefulness is that things should be easy to learn. It measures how easy it is for a new person to find their way around a website and start using it without a lot of help. A website with a high learnability level lets users quickly understand how it works and how it is structured. This is especially important for first-time guests who might get lost or confused in a complicated interface. It is important to make sure that the website is easy to understand and use from the start, which is important for keeping users interested and lowering return rates [5].

Efficiency refers to the measure of how fast and correctly users can perform their jobs on a website. In an effective website, the users quickly reach their goals without unnecessary delays or problems. This element of usability assumes greater importance when time is of essence, for instance, when the customers would want to conclude transactions in far lesser detail on e-commerce sites. Efficiency is related not only to the pace of execution a job is performed in but also to the flow of smooth coordination and fewer steps involved in an action.

The next important criterion is how well the website will be remembered by its users after some time has passed. If a website is well memorable, then users should not need to relearn using the site every time they revisit it. This becomes really important for the sites that are visited infrequently. Consistent navigation patterns, easily recognizable icons, and well-known design features will make the site stick in people's memory; thus, using it again would be easier. [6].

Error management includes design that assures users make few errors; when they do, the system should provide clear and constructive comments. A good website design entails that a few mistakes can be completely avoided; the time they occur, it's easy to fix them. Error messages that work well should be polite and clear and help users fix their mistakes without making them angry. Preventing errors is better than fixing them, which shows how important it is to make systems that are easy to use and forgiving [5].

Perhaps the most subjective and important part of usefulness is how satisfied the user is with the product. It shows the user's general opinion of the website and how they felt about using it. Not only should a website work well and be useful, but it should also be fun to use. It also states that the appearance of a website, clarity of information, and responsiveness of its interface impact user satisfaction. It is stated in [7] that good user experience builds trust, gets people coming back, and spreads the word through word of mouth.

Usability in website design is not just about making a site easy to use; it's also about making it fun and useful for the people who are supposed to be using it. People often say that

websites are easy to use because they are simple, clear, and quick to respond. The users of these sites are given a lot of thought, so every contact is made as easy and smooth as possible.

Usability also has much to do with the overall performance of a website, especially in respect to business objectives such as conversions, customer retention, and brand loyalty. A website that is easy to use, fast, and pleasant can really enhance the user experience, which may then translate into greater engagement and stronger overall performance. Due to this, usability testing has turned out to be an expected practice for website development. In other words, this allows developers to find and eliminate the problem well in advance of the website launch. Basically, usability is a multi-component feature and a vital concern of the website's effectiveness.

Emphasis on learnability, efficiency, memorability, error management, and user satisfaction will enable designers to create websites that not only do what users need them to do but also make the experience fun and interesting [5]. The usability methods for evaluating and then improving the websites are very much valid today. It ensures that websites can be used easily by all, work well, and are fun.

3 Methods

3.1 Research Object
The object of the study is Application Y, which has been used at University X since 2016. One of the most frequently used features by active students is the feature in designing the class enrolment (KRS). KRS is a program that is carried out simultaneously by all active students of University X. The KRS period usually is one week, scheduled sequentially from faculty to faculty. Usually, there are 2 faculties scheduled to do the class enrollment process in a day.

3.2 Subjects
The subjects of this research were students from the intake years 2020, 2021, and 2022 (as old students) and 2023 as new students, who studied at the Faculty of Engineering, University X. Samples were taken from students of 4 departments within the faculty: the Department of Information Systems, Electrical Engineering, Mechanical Engineering, and Industrial Engineering. The 19 seniors and 11 new students volunteered as respondents in the usability testing. Respondents will use Application Y to register courses, namely KRS, in a simulation.

3.4 Research Instruments and Procedures
Respondents will work on tasks on a dummy on a particular laptop. The dummy application is an artificial application with the same working system and appearance as the original KRS system. The scope of this dummy application is only related to the scenario tested in this study. For example, the application cannot move pages arbitrarily if pressed on an unwanted part of the page and the menu button will be directed using the hyperlink feature which will lead to the next page if correct, and return to the previous page if the wrong button is pressed. The dummy is made with 2 scenarios, namely the add classes and delete classes scenarios.

Respondents act as users and are tasked with working on tasks by inputting class enrollment simulations. The task in question is a case study if students will carry out activities to add classes (add classes) and delete classes (delete classes). The stages carried out start from the Main Menu, and then continue until the KRS stage has been completed.

1. "Add classes" task
   Users add classes starting from the start page when entering a username, up to adding several courses.
2. "Delete class" task
   User deletes a class created from the beginning to the end with the same menu bar and navigation as the original Application Y site.

3.5. Recording and Observation

When working on a task, the work is recorded using a screen record to record the duration of the work and the number of click errors. Then, the respondent's face is recorded using another device to find out the respondent's expression. Data collection is carried out using 1 laptop device; then, each respondent can work on the task of adding classes and removing classes using the KRS system. By using a dummy system that is made as similar as possible to the original site, respondents will get a similar experience when doing the KRS system on Application Y. The tasks started with the design display and the steps taken to add classes and delete classes.

From the results of the observation of the recording results, data was obtained in the form of the number of errors made by users when working on the task. The things that are considered are the processing time and the number of errors in pressing the command button, which is useful data to use as a benchmark for the level of usability felt by users in performing add class and remove class tasks.

3.6. Usability Scoring

In measuring the usability of Application Y, the research work has employed the Nielsen Attributes of Usability approach based on five factors: learnability, efficiency, memorability, mistakes, and satisfaction.
1. Learnability: How easily new users can execute a task unsupported.
2. Efficiency: How much time a user takes to accomplish a particular task.
3. Memorability: How well the user can remember operational tasks on the website/application
4. Error: Number of user click errors when working on the task.
5. Satisfaction: User comfort when using the application

This approach was used because it emphasizes user satisfaction using five fundamental ideas [8]. The approach has a strong correlation with user interaction satisfaction since it directly addresses the technical issues users encounter [9]. Over the past five years, the Nielsen Attributes of Usability technique has been frequently utilized to assess technology-based education systems, including website evaluations at University "B" [10] and e-learning at University "BL" [11].

4 Results and Discussion

4.1 Usability Testing Results

In a series carried out by new and old students, the class enrolment process is divided into 4 major steps, namely Sign In, Select, Delete, and Finish. In general, new students show a longer total task completion time than old students. Table 1. The third column shows the time that has been converted in seconds, to make it easier to compare.

From these results, it can be seen that in the early part, new students show a long processing time. This is most likely because they are still in the process of adapting to the application. In the select section, difficulties begin to be experienced because difficulties begin to arise in the process of entering courses, especially because the steps are quite complicated and repetitive. At the Delete and Finish steps, new students can do it a little faster. From observations, it can be seen that old students use their time to ensure that the tasks carried out are correct, thus creating a little extra time

Table 1. Steps total time of activities

Steps	Total times		Total times (seconds)	
	Old students	New students	Old students	New students
Sign In	04:06:42	07:10:42	246.042	430.042
Select	15:06:34	19:12:39	906.034	1.152.039
Delete	04:06:30	02:09:59	246.03	129.059
Finish	01:57:49	01:03:19	117.049	63.019
Total			1.269.371	1.774.159

The four major steps of the class enrollment simulation are divided into 26 sub-steps (Table 2). After Signing in, the user must perform the Select process by inputting Courses 6 times. Because in this scenario, the number of credits is limited, a warning will appear on the sixth course that the credits are insufficient. Therefore, the user must perform the next task: delete the last course and end the enrollment process.

Table 2. Task steps for the usability testing and the number of errors in each step

Steps	Sub-steps	#Error - old student	#Error - new student
Sign In	*Sign In*	2	0
	Main Menu	22	12
	Self Service	48	37
Select	*Enrollment: Add Class*	33	54
	Mata Kuliah 1	79	39
	Add Course Mata Kuliah 1	18	18
	Enrollment Menu	15	15
	Mata Kuliah 2	11	11
	Add Course Mata Kuliah 2	3	3
	Enrollment Menu	4	4
	Mata Kuliah 3	0	0
	Add Course Mata Kuliah 3	0	0
	Enrollment Menu	4	0
	Mata Kuliah 4	7	0
	Add Course Mata Kuliah 4	3	0
	Enrollment Menu	5	0
	Mata Kuliah 5	2	0
	Add Course Mata Kuliah 5	0	0
	Enrollment Menu	0	0
	Mata Kuliah 6	0	0
	Add Course Mata Kuliah 6	0	3
	IPS Tidak Cukup	7	3
Delete	*Delete Enrollment*	11	5
	Next	0	0
	Proceed 2 of 3	0	0
Finish	*Finish Enrollment*		

The Error column records the total number of errors made by each respondent when performing activities or navigating the menu according to the instructions that should be. These errors can occur when respondents press the wrong button or are confused in identifying the button to press. From Table 2, it can be seen that errors often occur during the initial stage (Sign in), both for old and new students. This shows that new students are starting to learn the system, while old students are starting to remember what they did last semester. The most errors occur when students start entering courses. Many errors are made when they try to learn and remember what to do, including finding the location of the button to press.

An interesting fact from Table 2 is that old students made relatively more mistakes at each stage than new students. From the observation, it is known that new students still look at the guide when doing this process, so they tend to be more careful in doing this simulation. On the other hand, old students only rely on memories, so many mistakes are made.

In this simulation, the users consisted of 24 new students and 19 old students. Of the 24 new students, it turned out that 10 people failed because they gave up and could not complete the task given, so the percentage of success was 58%. Meanwhile, the percentage of success of old students was 84.21% because 3 people could not complete the task. Table 3 presents partial results of usability testing for old students and new students. The pink color indicates the longest time. Empty red space without time indicates that the user cannot continue the task.

In addition to the fact that the simulation produced high errors - especially in some complex steps - these results indicate that the system is quite difficult to learn (low learnability). Even experienced students who have done this activity quite often have difficulty recalling this step (low memorability), and therefore make many errors. Once they understand how the system works, the remaining steps are passed relatively error-free.

Table 3. Some of the results of usability testing on old students (a) and new students (b). The pink color indicates the longest time. Empty space without time indicates that the user cannot continue the task

a. Old students

Sign In	Main Menu	Self Service	Enrollment : Add Class	Mata Kuliah 1	Add Course Mata Kuliah 1	Enrollment Menu	Mata Kuliah 2	Add Course Mata Kuliah2	Enrollment Menu	Mata Kuliah 3	Add Course Mata Kuliah 3
00:05:32	00:03:31	00:02:33	00:31:31	00:02:39	00:10:23	00:01:33	00:01:04	00:00:34	00:01:08	00:01:17	00:03:12
00:04:12	00:04:41	00:02:54	00:17:32	00:23:23	00:11:08	00:03:16	00:11:04	00:04:39	00:17:00	00:09:55	00:05:17
00:06:12	00:01:08	00:03:34	00:19:20	01:12:03	00:03:19	00:09:51	00:07:00	00:02:28	00:04:22	00:04:24	00:04:27
00:09:58	00:02:49	00:04:24	00:08:05	02:22:22	00:13:08	00:07:34	00:12:47	00:03:44	00:08:21	00:06:27	00:09:32
00:04:27	00:01:41	00:01:34	00:14:16	00:35:26	00:19:17	00:08:14	00:14:17	00:02:01	00:03:44	00:08:22	00:11:07
00:02:17	00:03:45	00:01:08	00:12:18								
00:05:19	00:03:21	00:04:07	00:09:33	02:35:37	00:12:11	00:07:18	00:14:09	00:04:03	00:11:24	00:09:35	00:04:56
00:06:05	00:03:01	00:02:12	00:07:05	02:40:00	00:38:29	00:08:39	00:01:57	00:02:22	00:05:04	00:01:34	00:02:30

b. New students

Sign In	Main Menu	Self Service	Enrollment : Add Class	Mata Kuliah 1	Add Course Mata Kuliah 1	Enrollme nt Menu	Mata Kuliah 2	Add Course Mata Kuliah2	Enrollme nt Menu	Mata Kuliah 3	Add Course Mata Kuliah 3
00:01:26	00:46:39	00:04:55	01:31:06	01:30:53	00:32:27	00:13:16	00:10:03	00:02:51	00:07:33	00:10:23	00:04:09
00:04:19	00:10:08	00:04:26	00:49:10	00:34:23	00:34:08	00:48:24	00:16:07	00:04:25	00:06:35	00:08:39	00:07:12
00:10:13	00:08:13	00:24:59	02:19:59	01:17:06	00:33:08	00:57:06	00:15:36	00:07:12	00:07:03	00:10:01	00:08:19
00:05:22	00:04:32	00:04:51	01:27:16	01:30:24							
00:05:14	00:07:13	00:04:25	02:48:11								
00:05:39	00:11:44	00:02:06									
00:03:41	00:04:29	00:13:19	00:10:31	00:24:12	00:11:01	00:04:45	00:06:17	00:07:30	00:06:01	00:05:12	00:08:12
00:04:27	00:04:27	00:07:03	00:53:40	02:44:54	01:54:18	00:14:31	00:17:19	00:15:19	00:08:25	00:02:31	00:09:11
00:04:39	00:04:44	00:04:11	00:16:35	01:57:01	00:05:14	00:08:13	00:13:03	00:05:04	00:05:15	00:06:30	00:08:18
00:05:42	00:03:00	00:01:40	00:14:37	00:33:29	00:07:28	00:16:14	00:07:20	00:06:45	00:02:11	00:06:55	00:04:54
00:08:11	00:06:45	00:03:34	00:06:29								
00:04:12	01:01:33	01:58:41	01:56:12								

The results of this usability testing are also supported by usability scores (Table 4) which are relatively only on the average scores of all items studied. There is a difference between the error value in usability testing and the usability score. From usability testing, the system causes several errors in selecting buttons that must be selected. Each wrong press is counted as an error, so that in a number of steps, the error value is quite high. On the other hand, according to the user's opinion, the system is not too risky to cause high errors (error value > 3). This is because the things being reviewed are different. Users argue that the system can prevent errors in filling in KRS because every time you press the wrong button, a warning will appear. The system also allows you to return to the previous stage, if an error occurs.

Table 4. Usability Scores

Statements	Old students		New students	
	Average	SD	Average	SD
Ease of operation	2.737	0.806	2.750	0.866
Design Appearance	2.316	1.003	2.667	0.888
Process flow	2.684	0.749	3.583	0.515
Ease of remembering tasks (Memorable)	2.842	0.834	3.000	0.603
Ease of learning (Learnability)	2.368	0.955	3.250	1.055
Possibility of doing the wrong step (Error)	3.053	1.026	2.917	0.669
Satisfaction after application operation (Satisfaction)	2.579	0.838	3.000	0.739
Efficiency of steps in operation (Efficiency)	1.947	0.911	2.500	1.000
Scores per student type	2.566	0.933	2.958	0.845
Overall scores	2.718	0.918		

The lowest value usability score is in efficiency. Both old and new students consider the system inefficient. Although the process flow is considered relatively clear (score > 3), the efficiency value is low (<2) because many repetitive steps must be taken, especially when adding courses. The addition or approval of MK must be done one by one, so if, for example, a student takes 6 MK, then this process must be repeated 6 times.

3.3. The Inefficiency in The Current System

Based on further interviews with respondents who participated in this study, several complaints were related to the user interface of the Y application. The appearance of the Class Enrolment module on Application Y is considered inefficient because the first section displays courses that are valid from semester 1 to semester 8. Then, students can immediately choose any available course, even though, according to the curriculum, several courses cannot be taken if they have not met the requirements in the previous prerequisite courses. Then, when you have finished choosing a course, if you want to choose another course, you must first return to the initial page to select a study plan. This is done periodically and continuously until students have finished choosing a study plan in one semester by fulfilling the number of credits determined by the supervising lecturer. Of course, the repetition movement of the University X Class Enrolment module is less effective because students need to return to the initial page first. In the current Class Enrolment module system, there are also several repetition steps.
After choosing one of the courses, it will return to the initial page. Thus, selecting courses by returning to the initial page like this step is considered inefficient. However, some students may take courses even though they have not fulfilled the applicable prerequisite courses.

Based on the usability testing, usability scores, and interview results, the recommendations are to improve the application so that it pays more attention to the user interface and user experience. Improvements should mainly be focused on minimizing repetitive steps, for example, when adding or approving classes. Several improvements related to the location and size of the buttons also need to be made so that users are not confused about finding the location of important buttons. Sometimes, the display info is too long so that it fills the screen, such as location, lecturer name, and time. In addition, the menu bar is sometimes filled with various menus that are not clear in their flow.

Bad experiences that are repeated every semester can potentially provide a negative word of mouth for the learning process and perception of the university as a whole. With this usability measurement, it is hoped that university management can be informed that there is a bad user experience related to the use of application Y.

As a follow-up to this research, further research is being conducted to improve application Y. This improvement focuses on addressing the things that are suggested to be improved based on this research. The various improvements made are expected to increase positive perceptions of the user experience of the class enrollment process

4 Conclusion

Based on usability measurements, this study shows that the application used for class enrollment is quite difficult to learn and difficult to remember. This is supported by the number of errors that are quite high in several steps of usability testing, as well as the usability score which is only moderate in all aspects. Based on the simulation conducted, the success score did not reach 100%, which was only 58.33% for new students and 84.21% for old students. This

figure shows that some participants gave up because they could not carry out the tasks given. Improvements are mainly aimed at the lowest usability score, namely efficiency. Recommendations for improvement are to reduce repetition in the class enrollment process and improve the display, especially related to the placement and size of critical buttons. This study is expected to be input for management to be able to pay more attention to the ease of the class enrollment process, thereby increasing the overall positive experience for application users.

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