

# Usability Testing of Industrial Engineering UPNVJT Website Using Eye Tracking and System Usability Scale

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**Abstract:** Websites are essential for agencies and organizations to ensure their information is accessible to the public. The eye tracker method is effective for evaluating user usability. The Industrial Engineering Study Program at Universitas Pembangunan Nasional "Veteran" East Java has an official website, [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id), which has not been tested for usability. Initial problem identification revealed issues such as inaccessible menus and hidden information. This study aims to assess and improve the user experience on the website using a combination of Eye Tracking and System Usability Scale (SUS) methods. The average effectiveness score for 39 respondents is 89.10%, with 8% rated as ineffective, 28% as effective enough, and 64% as very effective. The efficiency value, measured across 39 respondents and 4 tasks, is 0.0276 goals/second, indicating each respondent completes 2.76% of tasks per second, requiring about 36.23 seconds to reach 100% task completion. The initial SUS score was 69.49%. Five issues were identified in the Home, Facilities, Education, Thesis, and MBKM sections and one design issue. A prototype was developed and tested, resulting in a final SUS score of 80.06%, placing the website in the marginally high acceptability range, category B for grade scale, and excellent for adjective ratings. The SUS score improvement was 10.57%. This research shows that combining Eye Tracking and SUS is an effective method for increasing website usability. The implications of this research can help organizations improve the quality of their websites and provide a better user experience.

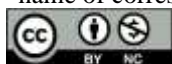
**Keywords:** Eye Tracking; SUS; Usability; Website

## INTRODUCTION

Websites are one of the most popular promotional media today. Websites have unlimited reach in time and space (Surentu et al., 2020). Utilizing websites is now a necessity for many agencies and organizations so that information on these agencies and organizations can be seen and accessed by the wider community (Suandi et al., 2021). The student academic system has an important role in supporting student activities in higher education using a website system (Putra et al., 2023).

The Industrial Engineering Study Program at the Universitas Pembangunan Nasional "Veteran" East Java has an official website, namely [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id). However, [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id) website has never been tested for usability to identify problems that users may encounter when using the system, as well as to determine areas where improvements are needed to improve the quality of the user experience. Identification of initial problems on the website found several problems such as the "Quality Assurance" menu still appearing "Oops! That page can't be found.", next for users who have never accessed this menu do not know that the two icons can be clicked, there are also the "Curriculum

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Tree 2023" menu is empty or inaccessible, and finally access to the sample thesis file is hidden in a file with the font used being too small. Based on the identification of the problem, it is necessary to carry out testing to find out how satisfied users are with the website as a whole (Suandi et al., 2021). The tests designed in this research utilized the Eye Tracking Method and for usability testing used the System Usability Scale (SUS) Method. The eye tracking method has the advantage of observing the user's eye movements directly when accessing a website (Sidhawara et al., 2023). From the user's eye movements that have been recorded, the user's experience when interacting with the display of the [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id) website will be analyzed. The System Usability Scale (SUS) method aims to determine the level of user satisfaction in using the system. This method involves the user's views and assessments, making it easier to make improvements according to user needs (Sari & Tania, 2022).

However, there are still challenges in optimizing the user experience, especially through the usability aspect. Therefore, the combination of the eye tracking method and the System Usability Scale (SUS) is considered relevant in evaluating user interactions on websites, the eye tracking method allows direct analysis of user eye interactions, while the SUS provides quantitative measurements of effectiveness, efficiency and satisfaction, according to with ISO 9241-11 standards.

Based on research from (Rambe, 2022), researchers will conduct better research using a combination method of eye tracking and system usability scale by setting the number of respondents at 39 people in accordance with Jakob Nielsen's theory (Nielsen, 2012). Researchers will also provide design proposals in the form of prototypes. The results of this analysis are useful for evaluating whether the [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id) website. is enough to satisfy users or needs to be evaluated based on the findings of tests that will be carried out later. Furthermore, this research becomes relevant in supporting efforts to improve the quality of industrial engineering education by providing a strong empirical basis for website improvement and development. By understanding user eye interaction patterns, industrial engineering education institutions can design more effective and efficient online experiences, helping students and related stakeholders to access information more easily and pleasantly.

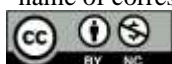
## LITERATURE REVIEW

Usability testing is a measure of a characteristic that refers to how a user can learn and use a system or product to obtain goals and satisfaction with its use (Deni and Ferida, 2023). Innovation is born from user experience, that is usability. This is continuously done, so that the product can be used as optimally as possible. Usability testing is a type of non-functional software testing that involves elements of human interaction in its assessment. There are several terms in human-computer interaction design, including user interface, user experience and usability (Wahyuningrum, 2021). Carrying out usability testing may or may not involve users directly. Therefore, usability plays a crucial role in websites and applications because it leads to ways to increase ease of use during the process of creating them, so that the resulting application or website can achieve a high score in terms of usability (Rambe, 2022).

Eye tracking is used to observe differences between visual and verbal cognitive styles when participants observe images and text in multimedia learning. Previous studies have shown that differences in visual stimulus information processing can be identified from eye tracking metrics. Eye tracking is useful because it provides more objective data with less bias. Eye tracking metrics serve as a source of in-depth information that provides an overview of a user's cognitive processes. The combination of statistical data processing, interviews, and eye tracking helps to gain a deeper understanding of user behavior in processing information during multimedia learning (Sidhawara et al., 2023). In the field of information technology, systems with eye-based interaction (eye tracking) are widely implemented with the aim of being able to interact with the content within them more quickly and easily (Herlina, 2020).

According to ISO 9241-11 usability, usability is defined as the extent to which a product can be used by users to achieve the expected goals with effectiveness, efficiency and satisfaction in the expected context of use. Based on this understanding, usability is the benefit that users obtain by using an application to complete their work or search for the desired information (Sara et al., 2019). The System Usability Scale method has been freely available and used in system evaluation by research colleagues and usability engineers since 1986, and in 1996 contributed to usability engineering in industry. SUS

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has been incorporated into commercial usability evaluation tools such as Morae, and is referred to as an —industry standard, although it has never gone through a formal standardization process (Wahyuningrum, 2023)

Based on the literature review carried out, the eye tracking method has the advantage of seeing the user's eye movements directly when accessing the website. This method proves that eye movement recording is able to describe the user's experience in interacting with the website interface (Silviana & Sihotang, 2023). The System Usability Scale (SUS) has the advantages of simplicity and effectiveness. Its main strength lies in its ease of use, as it produces live scores ranging from 0 to 100, making interpretation and comparison easy. Additionally, SUS requires little effort to administer, as it does not involve complex calculations or extensive training. Additionally, SUS is available for free, eliminating additional licensing costs. Finally, the SUS has demonstrated validity and reliability, even with small sample sizes. These advantages make SUS an invaluable tool for researchers and practitioners who want to assess the usability of websites, applications, and other digital products. Its simplicity and affordability allow for widespread application, while its proven reliability ensures the validity of its results (Kurniawan et al., 2022).

## METHOD

This research was conducted at the Ergonomics Laboratory of the Industrial Engineering Study Program, Universitas Pembangunan Nasional "Veteran" East Java. The data collected in this research is data on the time required by users to complete tasks, data on the number of tasks completed, and SUS questionnaire data. Respondents in this research were active students of the Industrial Engineering Study Program at the Universitas Pembangunan Nasional "Veteran" East Java, Classes of 2020, 2021 and 2022. In this research, usability testing was carried out combined with the eye tracking method, so that the number of respondents required was a minimum of 39 respondents.

Data collection was carried out through the following stages:

### 1. Confidentiality Agreement

In minutes 0-5, users as participants in the research are required to fill out a confidentiality agreement, where the researcher guarantees the confidentiality of the participant's identity and consent to become research respondents.

### 2. Pre-Test Questionnaire

Next, participants fill out the pre-test questionnaire in approximately 5 minutes. The questionnaire contains the participant's personal identity, usually including name, class year, gender, or other things that the researcher needs to know.

### 3. Task Execute

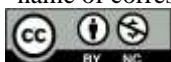
Participants will carry out all tasks, while researchers observe behavior and record the time for completing each task item in seconds. The tasks used in this research are as follows:

- 1) Look for information about 2 laboratories and room facilities for the Industrial Engineering Study Program, Universitas Pembangunan Nasional "Veteran" East Java.
- 2) Access all information regarding the latest "Curriculum", namely "Socialization of the 2023 Curriculum", "Curriculum 2023", and "Curriculum Tree 2023"
- 3) Access the sample thesis submission file
- 4) Access information about "MBKM" MBKM is the abbreviation of *Merdeka Belajar Kampus Merdeka*, "Conversion", "Output", "Partner", "Document", "MBKM Team"
- 5) The results of these eye tracking observations will later be used as a basis for improved design layouts according to the user's heatmap. The eye tracking software used is Eyevido.

### 4. Post-Test Questionnaire

After completing the task, participants filled out the post-test questionnaire. This questionnaire contains 10 questions referring to the SUS method. The SUS questionnaire used in this research is as follows:

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Table 1. SUS questionnaire

Number	Statement Items	1	2	3	4	5
1	I think I will use this system again	O	O	O	O	O
2	I find this system complicated to use	O	O	O	O	O
3	I find this system easy to use	O	O	O	O	O
4	I need help from other people or technicians in using this system	O	O	O	O	O
5	I feel that the system features work as they should.	O	O	O	O	O
6	I feel there are many things that are inconsistent (not harmonious) in this system.	O	O	O	O	O
7	I feel like others will figure out how to use this system quickly.	O	O	O	O	O
8	I find this system confusing	O	O	O	O	O
9	I feel there are no obstacles in using this system	O	O	O	O	O
10	I need to get used to it first before using this system	O	O	O	O	O

\*1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

### 5. Data Processing

In measuring usability on websites, there are 3 attributes mentioned in ISO 9241-11. Usability can be measured using the usability matrix method. The following is the formulation of a usability matrix to calculate the attributes of effectiveness, efficiency and satisfaction (Rambe, 2022).

#### A. Effectiveness

The effectiveness value is measured based on the average success of all respondents in carrying out their tasks. The formula for calculating effectiveness is as follows:

$$\text{Effectiveness} = \frac{\text{Number of Completed Tasks}}{\text{Number of Tasks given}} \times 100\% \quad (1)$$

#### B. Efficiency

Efficiency is measured based on the average value of the speed of time required by all test respondents from all types of users on the specified website, namely 39 respondents. Previously, data on task scenario work by each respondent and data on work time for each task scenario during testing were calculated using the time based efficiency equation. (Tuloli et al., 2022)

$$\text{Time Based Efficiency} = \frac{\sum_{j=1}^R \sum_{i=1}^N \frac{n_{ij}}{t_{ij}}}{NR} \quad (2)$$

Information:

N = Number of tasks

R = Number of users/respondents

N<sub>ij</sub> = Results of task (i) completed by respondent (j), if resolved, the value is 1, if not resolved, the value is 0.

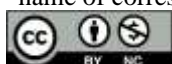
T<sub>ij</sub> = Time spent by the user/respondent (j) for complete task (i).

#### C. Satisfaction

The System Usability Scale (SUS) calculates user satisfaction by subtracting 1 from the score of odd-numbered questions and 5 minus the score from even-numbered questions. The sum of these adjusted scores is then multiplied by 2.5 to produce a final score, Score calculation rules apply to 1 respondent. For further calculations, the SUS score of each respondent is sought for the average score by adding up all the scores and dividing by the number of respondents (Wahyuningrum, 2021).

After knowing the results of usability testing on the Industrial Engineering website of the Universitas Pembangunan Nasional "Veteran" East Java, the next stage is to provide a design recommendations for the appearance of the website with a prototype using Figma.

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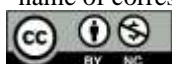
**RESULT**

**Effectiveness**

Table 2. Effectiveness Value Calculation Results

Number	Task				Effectiveness Value %	Achievement Level
	T1	T2	T3	T4		
1	1	1	1	1	100	Very effective
2	1	1	1	1	100	Very effective
3	1	1	1	1	100	Very effective
4	1	1	0	1	75	Effective enough
5	1	1	1	1	100	Very effective
6	1	1	1	1	100	Very effective
7	1	0	1	1	75	Effective enough
8	1	1	1	1	100	Very effective
9	1	1	1	1	100	Very effective
10	1	1	1	1	100	Very effective
11	1	1	1	1	100	Very effective
12	1	1	1	1	100	Very effective
13	0	0	1	1	50	Ineffective
14	1	1	0	1	75	Effective enough
15	1	0	1	1	75	Effective enough
16	1	1	1	1	100	Very effective
17	0	1	1	1	75	Effective enough
18	1	1	1	1	100	Very effective
19	1	1	1	1	100	Very effective
20	1	1	1	1	100	Very effective
21	1	1	1	1	100	Very effective
22	1	1	1	1	100	Very effective
23	1	1	1	1	100	Very effective
24	1	0	1	1	75	Effective enough
25	1	1	1	1	100	Very effective
26	1	1	1	1	100	Very effective
27	0	1	0	1	50	Ineffective
28	1	1	1	1	100	Very effective
29	1	1	1	1	100	Very effective
30	1	1	0	1	75	Effective enough
31	1	1	0	1	75	Effective enough
32	1	1	1	1	100	Very effective
33	1	1	0	1	75	Effective enough
34	1	0	0	1	50	Ineffective
35	0	1	1	1	75	Effective enough
36	1	1	1	1	100	Very effective
37	1	1	1	1	100	Very effective
38	1	1	0	1	75	Effective enough
39	1	1	1	1	100	Very effective
<b>Average Effectiveness Value</b>					<b>89,10%</b>	

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After calculating effectiveness, to see the user's level of achievement, it is interpreted based on R&D reference standards in 1991.

**Table 3. Standard Measures of Effectiveness**

Number	Effectiveness Ratio	Achievement Level
1	<40%	Very Ineffective
2	40% - 59,99%	Ineffective
3	60% - 79,99%	Effective enough
4	≥ 80%	Very effective

Source: (Tuloli et al., 2022)

Based on the calculations that have been carried out, it can be seen that the average effectiveness value of the 39 respondents is 89.10%. If we refer to the R&D reference standards in 1991, the value of 89.10% is in the very effective category. However, to see the level of effectiveness achieved by each respondent, you can see the following graph:



Figure 1. Respondent's Level of Effectiveness Achievement

Based on the graph of the level of effectiveness achieved by respondents, it can be seen that the ineffective category is 8%, namely 3 out of 39 respondents, quite effective at 28%, namely 11 out of 39 respondents, and very effective at 64%, namely 25 out of 39 respondents. There are categories of ineffective and quite effective because as many as 14 respondents still have not completed all the tasks that have been given.

**Efficiency**

Table 4. Efficiency Value Calculation Results

Number	Nij				Tij				Nij/Tij			
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
1	1	1	1	1	58	72	22	49	0,017	0,014	0,045	0,020
2	1	1	1	1	51	36	15	30	0,020	0,027	0,067	0,033
3	1	1	1	1	35	34	38	42	0,028	0,029	0,026	0,024
4	1	1	0	1	64	56	54	38	0,016	0,018	0,000	0,026

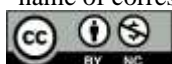
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Number	Nij				Tij				Nij/Tij	Nij/Tij	Nij/Tij	Nij/Tij
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
5	1	1	1	1	50	55	30	43	0,020	0,018	0,034	0,023
6	1	1	1	1	57	50	27	43	0,018	0,020	0,036	0,023
7	1	0	1	1	58	70	61	54	0,017	0,000	0,016	0,018
8	1	1	1	1	54	25	22	42	0,019	0,040	0,045	0,024
9	1	1	1	1	66	51	8	18	0,015	0,020	0,118	0,056
10	1	1	1	1	39	49	92	36	0,026	0,020	0,011	0,028
11	1	1	1	1	57	38	44	31	0,017	0,027	0,023	0,032
12	1	1	1	1	63	29	29	27	0,016	0,035	0,035	0,037
13	0	0	1	1	46	142	29	35	0,000	0,000	0,035	0,028
14	1	1	0	1	45	53	38	29	0,022	0,019	0,000	0,035
15	1	0	1	1	50	24	43	15	0,020	0,000	0,023	0,065
16	1	1	1	1	65	49	68	38	0,015	0,020	0,015	0,026
17	0	1	1	1	66	95	43	35	0,000	0,011	0,023	0,028
18	1	1	1	1	41	25	34	26	0,025	0,040	0,029	0,039
19	1	1	1	1	43	24	51	18	0,023	0,042	0,020	0,055
20	1	1	1	1	39	31	13	33	0,026	0,032	0,076	0,031
21	1	1	1	1	48	52	22	35	0,021	0,019	0,045	0,028
22	1	1	1	1	59	34	17	27	0,017	0,029	0,058	0,037
23	1	1	1	1	47	32	39	23	0,021	0,031	0,026	0,043
24	1	0	1	1	35	135	21	46	0,029	0,000	0,048	0,022
25	1	1	1	1	33	27	16	41	0,030	0,037	0,063	0,024
26	1	1	1	1	31	19	22	21	0,032	0,053	0,045	0,048
27	0	1	0	1	78	55	68	30	0,000	0,018	0,000	0,033
28	1	1	1	1	32	44	38	24	0,031	0,023	0,026	0,042
29	1	1	1	1	58	77	14	28	0,017	0,013	0,071	0,036
30	1	1	0	1	51	23	98	16	0,020	0,043	0,000	0,063
31	1	1	0	1	46	34	57	21	0,022	0,029	0,000	0,048
32	1	1	1	1	58	72	22	49	0,017	0,014	0,045	0,020
33	1	1	0	1	63	44	127	20	0,016	0,023	0,000	0,050
34	1	0	0	1	24	113	152	29	0,042	0,000	0,000	0,034
35	0	1	1	1	32	40	46	31	0,000	0,025	0,022	0,032
36	1	1	1	1	28	36	53	25	0,036	0,027	0,019	0,040
37	1	1	1	1	35	23	38	36	0,028	0,043	0,026	0,028
38	1	1	0	1	62	31	124	12	0,016	0,032	0,000	0,083
39	1	1	1	1	38	36	22	41	0,026	0,027	0,045	0,024
<b>Time Based Efficiency</b>									<b>0,0276 goal/second</b>			

Based on the calculations that have been carried out, it can be seen that the time based efficiency value of 39 respondents and 4 tasks is 0.0276 goal/second. This shows that each respondent can complete the task 2.76% per second. So to reach 100% it takes around 36.23 seconds.

\*name of corresponding author



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**Satisfaction (System Usability Scale)**

Table 5. SUS Score Results on The Website

Number	Hasil Perhitungan Skor SUS										Jumlah	Nilai
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
1	3	3	3	3	3	2	2	2	3	3	27	68
2	2	3	3	2	3	2	4	3	3	4	29	73
3	3	2	4	3	4	4	2	3	3	4	32	80
4	3	3	2	1	2	3	2	2	0	0	18	45
5	4	3	3	4	3	2	3	1	2	4	29	73
6	2	2	2	3	2	3	2	2	3	3	24	60
7	2	3	1	2	1	2	2	1	2	3	19	48
8	3	3	2	2	2	3	3	3	2	2	25	63
9	4	3	4	3	4	3	3	4	3	4	35	88
10	1	2	4	4	4	2	4	4	1	4	30	75
11	2	3	3	4	3	3	3	4	4	3	32	80
12	3	3	4	4	4	3	4	4	1	4	34	85
13	4	3	3	2	3	3	0	2	2	3	25	63
14	2	3	3	2	3	2	2	2	0	2	21	53
15	2	3	2	2	2	3	2	2	4	2	24	60
16	4	4	4	3	4	2	4	4	2	4	35	88
17	2	3	3	2	3	2	3	0	0	4	22	55
18	4	3	4	4	4	2	3	4	2	4	34	85
19	3	3	4	3	4	3	3	3	2	3	31	78
20	2	3	3	3	3	3	3	3	0	3	26	65
21	2	4	3	2	3	3	4	2	2	3	28	70
22	2	3	3	2	3	3	3	4	4	3	30	75
23	3	3	4	4	4	3	3	4	3	4	35	88
24	3	2	2	3	2	2	3	3	2	4	26	65
25	3	4	3	4	3	3	3	3	3	4	33	83
26	3	3	3	3	3	2	1	3	2	3	26	65
27	1	2	1	1	1	4	3	1	4	4	22	55
28	4	4	4	4	4	3	2	4	2	4	35	88
29	3	4	4	4	4	3	4	3	0	4	33	83
30	4	3	3	2	3	3	0	4	2	2	26	65
31	4	4	4	4	4	3	4	4	0	4	35	88
32	2	3	3	2	3	2	4	2	4	2	27	68
33	2	3	3	2	3	2	1	2	2	2	22	55
34	3	3	2	1	2	0	1	3	1	4	20	50
35	3	3	3	4	3	2	1	0	1	2	22	55
36	3	3	4	3	4	3	3	0	1	4	28	70
37	3	3	3	2	3	2	2	2	1	3	24	60
38	3	3	3	4	3	2	3	4	4	4	33	83
39	3	3	3	3	3	2	2	2	3	3	27	68
<b>Skor SUS Rata-rata (Hasil Akhir)</b>											<b>69,49</b>	

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Based on the calculations that have been carried out, it can be seen that the average final SUS score of the 39 respondents was 69.49. To determine acceptability ranges, grade scales, adjective ratings, a comparison of the average assessment results of the respondents is carried out based on the following figure:

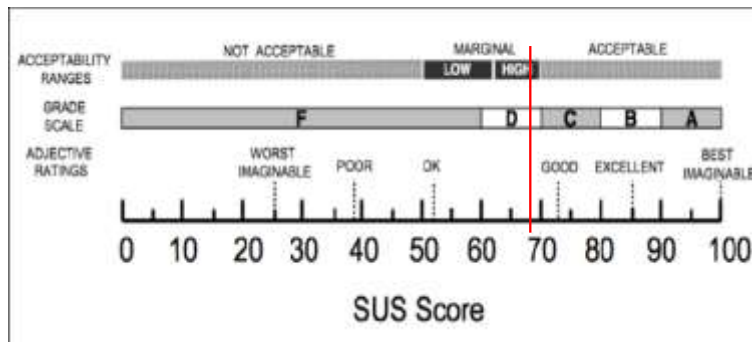


Figure 2. SUS Score Results on the Website

According to Salamah, 2019 in Rambe, 2023, it is stated that the resulting SUS scores are then analyzed and interpreted using the acceptability category, grade scale and adjective rating with a scale of multiples of 10. Scale 1 - >10 is included in the worst rating. imaginable, a score of >10 - 20 is rated awful, a score of 20 - >30 is rated poor, a score of >30 - >50 is rated ok, a scale of >50 - >70 is rated good, a scale of > 70 - >80 is included in the excellent rating, while the scale >80 to >90 is included in the best imaginable rating.

Based on the graph above, it can be concluded that the results of the respondents' assessment of the tekindustri.upnjatim.ac.id website for acceptability ranges are in the marginal high category, the grade scale is in the D category, and the adjective ratings are in the Good category. In accordance with the results of this assessment, the tekindustri.upnjatim.ac.id website can be accepted by users.

### Eye Tracking Observation Results

Eye tracking observations on the tekindustri.upnjatim.ac.id website using Eyevido software. This observation was carried out directly on 39 respondents. Eyevido has a feature to see the overall results. The results that will be analyzed are heatmap, view path and attention map. Before carrying out the eye tracking test, the respondent/user will carry out a calibration first. The accuracy level for calibration on Eyevido must be more than 70%, if it is still below 70% then recalibration will be carried out. The results of these eye tracking observations are used as a basis if design improvements need to be made. So, redesigning the website appearance will be adjusted to the user's eye movement patterns.



Figure. 3 Home page Heatmap



Figure. 4 Home page View Path



Figure. 5 Home page Attention Map

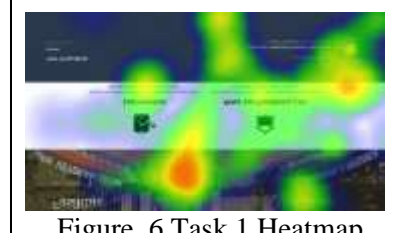


Figure. 6 Task 1 Heatmap

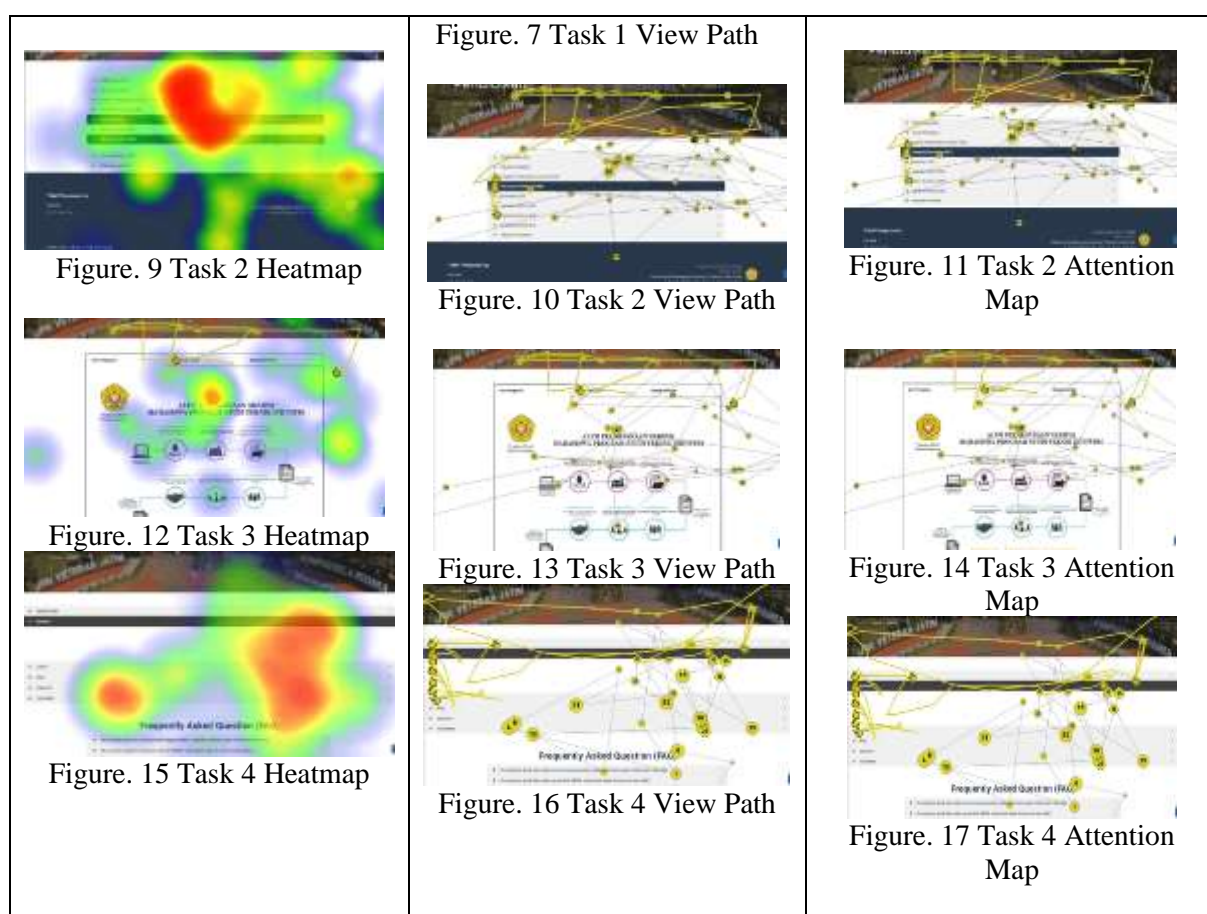


Figure. 8 Task 1 Attention Map

\*name of corresponding author



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### Identify Problems and Solutions

Table 6. Identify Problems and Solutions

Trouble Code	Problem Description	Maintenance Plan
T-1	On the "Home page" menu there are important news and announcements but they are not displayed at the top	Set the "Home page" layout by displaying "Important Information" and "Latest News" at the top
	Based on the heatmap and attention map results, it can be seen that the menu bar location is not suitable for the comfort of the user's eyes when looking at the screen.	Place the menu bar in the area that corresponds to the heatmap and attention map results, namely the middle area.
M-2	The "Laboratory" and "Classes and Other Support" menu icons don't quite match their names.	Replace icons with photos of laboratories and classrooms and supporting facilities.
	There are no buttons, so many users don't know that there is more information in it.	Added a "More Information" button so that users know that there is still more complete information.
M-3	In the "Education" menu, most users don't know that it contains information about the 2023 Curriculum. Because they can't see the submenus in it.	Create options on the "Educational Information" menu bar so that users know what sub menus are in it.

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Trouble Code	Problem Description	Maintenance Plan
M-4	Users have difficulty finding examples of thesis files because the links to example thesis files are hidden in PDF files with very small fonts.	Added a "Download Sample File" button so that users/students don't have difficulty finding this information.
M-5	There are empty sub menus so a lot of information is not conveyed, such as "Curriculum Tree 2023" on the "Education" menu and "Partner" on the "MBKM" menu.	Provide the words "Coming Soon" if the information is in the process of being corrected. So that users know that the menu is still under construction.
	The placement of the sub menus in the "MBKM" menu is less attractive and seems flat.	Set the sub menu layout in the "MBKM" menu according to the results of the user's heatmap and attention map. As well as adding 3D icons that look attractive.
M-6	The color palette used on the tekindustri.upnjatim.ac.id website is currently considered less attractive by users and several design improvements need to be made so that users are comfortable and satisfied when using the website.	Change the website color palette to more vibrant colors, giving a youthful and modern impression. Because this color scheme is very suitable among young people.

### Recommended Design Results

The design software used is Figma. Figma is a graphic design application for designing prototypes and user interfaces for digital products such as smartphone applications and websites. After creating a prototype using Figma, it does not mean that the application or website is ready for use by the general public. In order to become a smartphone application or website, you have to do coding (Agung, 2023). The process of redesigning the appearance of this website is adjusted to identify problems that have been carried out after eye tracking testing. There are 6 problem codes that we will try to fix. 5 problems related to several menu bars, namely Home, Facilities, Education, Thesis, and MBKM. Meanwhile, 1 problem code is related to an unattractive appearance, so changes are needed in terms of color palette, layout and several other items.

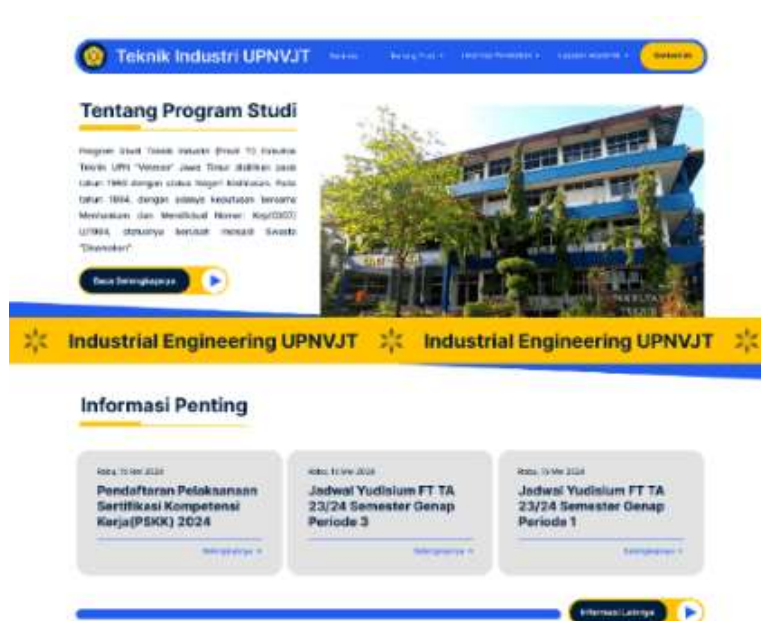


Figure 18. Home Page Design

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Several changes from the previous design, namely a brief explanation of the study program on the homepage with an attractive design, important information is displayed at the top after a brief explanation of the study program, the design display for the latest news is made more minimalist to make it look modern, the menu bar layout is flatter and provides a polygon symbol as a sign that the sub menu contained therein can be seen first.



Figure 19. Facilities Design

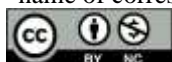
Several changes from the previous design, namely providing illustrations that are in accordance with the existing facilities at the UPN Veteran East Java Industrial Engineering Study Program by displaying photos in the preview section, adding a button to display the next page so that users do not need to look for which part can be pressed, more design changes fresh with several design elements such as UPNVJT Industrial Engineering typography and several other ornaments, providing a hyperlink on the access button to the LSIE and LSMI website pages, changing the "Classes and Other Support" sub menu to "Classes and Supporting Facilities".



Figure 20. Education Design

Several changes from the previous design, displays a preview of the sub menu in the “Education” menu bar so that users can see some of the information in the “Education” menu bar. Displays the curriculum page.

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Figure 21. Thesis Design

Several changes from the previous design, there is a button to download a sample thesis file. The name of the “Information” menu is replaced with “Academic Services” so that the “PKL” and “Thesis” menus are not in the sub-menu.



Figure 22. MBKM Design

Several changes from the previous design, there are 3D icons to make the Education page look more attractive, the grid sub menu layout is adjusted to the user's heatmap, provides the information "Coming Soon" on the “Partner” menu.

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### Prototype Usability Testing Results

After making a prototype, it is necessary to carry out re-testing to compare the initial System Usability Scale (SUS) value before and after design improvements. Below are the results of calculating the SUS score on the prototype:

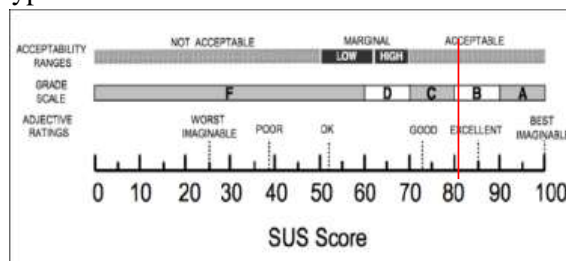


Figure 23. SUS Score Results on The Prototype

Based on the graph above, it can be concluded that the results of respondents' assessments of the [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id) website prototype for acceptability ranges are in the marginal high category, the grade scale is in category B, and the adjective ratings are in the excellent category. In accordance with the results of this assessment, the prototype website [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id) can be accepted by users.

### DISCUSSIONS

After obtaining the SUS score results from prototype testing, it is necessary to compare the initial SUS score and the final SUS score. The comparison of initial and final SUS scores is as follows:

Table 7. Comparison of SUS Score Results

System Usability Scale Testing	SUS Score
Initial Testing on the Website	69,49
Final Testing on Website Prototype	80,06
Enhancement	10,57

Based on the comparison of the SUS scores from the two tests, it can be seen that the initial SUS score on the website received a score of 69.49, while the final SUS score on the prototype received a score of 80.06. So, the comparison of the initial and final SUS scores was 10.57%.

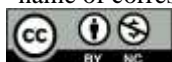
### CONCLUSION

Based on the results of usability testing on the Industrial Engineering website of the Universitas Pembangunan Nasional "Veteran" East Java using the Eye Tracking method, there are 5 problems, namely Home, Facilities, Education, Thesis, and MBKM. As well as 1 problem related to display design. It can be seen that the average effectiveness value of the 39 respondents was 89.10%. Details of the effectiveness value of each respondent for the ineffective category were 8%, quite effective 28%, and very effective 64%. Then the efficiency value for 39 respondents and 4 tasks was 0.0276 goals/second. This shows that each respondent is able to complete the task at 2.76% per second. So to reach 100% it takes around 36.23 seconds. Meanwhile, the initial System Usability Scale method on the [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id) website produced a score of 69.49%.

The next stage is to create a prototype design for the [tekindustri.upnjatim.ac.id](http://tekindustri.upnjatim.ac.id) website. and testing was carried out which resulted in the final SUS score on the prototype getting a score of 80.06% so that the acceptability range was in the marginal high category, the value scale was in category B, and the adjective assessment was in the very good category. . So the comparison of the initial and final SUS scores is 10.57%.

Future research should employ advanced eye tracking tools and additional usability metrics to further improve user experience. This research provides an empirical basis for improving industrial engineering education websites, helping students and stakeholders access information more effectively.

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## REFERENCES

- Agung, G. (2023). *Desain UI/UX Dengan Figma*. Jubilee Solusi Enterprise.
- Herlina. (2020). Algoritma Pemilihan Objek pada Interaksi Antarmuka Berbasis Titik Pandang Mata. *Jurnal Teknik Informatika Dan Sistem Informasi*, 5(3), 397–405. <https://doi.org/10.28932/jutisi.v5i3.1984>
- Kurniawan, E., Nofriadi, N., & Nata, A. (2022). Penerapan System Usability Scale (Sus) Dalam Pengukuran Kebergunaan Website Program Studi Di Stmik Royal. *Journal of Science and Social Research*, 5(1), 43. <https://doi.org/10.54314/jssr.v5i1.817>
- Nielsen, J. (2012). *How Many Test Users in a Usability Study?* Nielsen Norman Group.
- Putra, I. N. T. A., Ramadhani, H. S., & Aje, S. H. (2023). Analisa Website Sistem Akademik Institut Bisnis Dan Teknologi Menggunakan Metode UEQ ( User Experience Questionnaire ). *Jurnal Satya Informatika*, 8(01), 95–103. <https://doi.org/10.59134/jsk.v8i01.243>
- Rambe, E. (2022). *Analisis Tes Usability Menggunakan Metode Eye Tracking Pada Website AOC Universitas Medan Area*. Universitas Medan Area.
- Salamah, I. (2019). *Evaluasi Usability Website Polsri Dengan Menggunakan System Usability Scale*. 8, 176–183.
- Sara, F. K. D., Soedijono, B. W. A., & Arief, M. R. (2019). Evaluasi Website Pemerintah Kabupaten Rembang Dengan Metode Usability Testing. *Jurnal Teknologi Informasi*, 14(3), 18–24.
- Sari, M. A., & Tania, K. D. (2022). Evaluasi Usability Pada Knowledge Management System (KMS) Menggunakan Metode System Usability Scale (SUS) (PT. Telekomunikasi Indonesia Witel Sumatera Selatan). *JBME: Jurnal Bisnis, Manajemen Dan Ekonomi*, 3(3), 134–146.
- Sidhawara, A. P., Wibirama, S., & Suroso, D. J. (2023). Kajian Eye-Tracking Pengaruh Gender Terhadap Proses Kognitif dalam Pembelajaran Multimedia. *Jurnal Nasional Teknik Elektro Dan Teknologi Informasi*, 12, 137–143.
- Silviana, N. A., & Sihotang, T. A. (2023). Usability Test on a Learning Website by Using the Eye Tracking Method. *International Journal of Research in ...*, 6(1), 48–51. <https://journal.ijresm.com/index.php/ijresm/article/view/2508%0Ahttps://journal.ijresm.com/index.php/ijresm/article/download/2508/2451>
- Suandi, F., Sibagariang, S., Amalia, Y. K., & Firdaus, M. B. (2021). Usability Testing Situs Web Politeknik Negeri Batam Menggunakan Metode Eye Tracking. *Jurnal Integrasi*, 13(1), 78–83. <https://doi.org/10.30871/ji.v13i1.3025>
- Surentu, Y. Z., Warouw, D. M. D., & Rembang, M. (2020). Pentingnya Website Sebagai Media Informasi Destinasi Wisata Di Dinas Kebudayaan Dan Pariwisata Kabupaten Minahasa. *Acta Diurna Komunikasi*, 2(4), 1–17. <https://ejournal.unsrat.ac.id/index.php/actadiurnakomunikasi/article/view/31117/29843>
- Tuloli, M. S., Patalangi, R., & Takdir, R. (2022). Pengukuran Tingkat Usability Sistem Aplikasi e-Rapor Menggunakan Metode Usability Testing dan SUS. *Jambura Journal of Informatics*, 4(1), 13–26. <https://doi.org/10.37905/jji.v4i1.13411>
- Wahyuningrum, T. (2021). *Mengukur Usability Perangkat Lunak* (Issue 1596). Deepublish Publisher.