RESEARCH ARTICLE

WEB APPLICATION QUALITY MEASUREMENT USING HEURISTIC METHOD

Pualam Dipa Nusantara

Faculty Member, Computer Science Department, School of Computer Science, Bina Nusantara University.

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Manuscript Info	*Abstract*

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Sinta.kemdikbud.go.id is a web application owned by the Indonesian government under the Ministry of Education and Culture which facilitates the indexing of all research results published in research journals. The indexing website for research results, which are mostly owned by researchers among lecturers, makes it easier for users to find and take advantage of published research results. It's just that the quality of the web application needs to be considered to maximize the experience received by its users. This study aimed to measure the quality of the sinta.kemdikbud.go.id website using the Heuristic Usability method. The results obtained are the website sinta.kemdikbud.go.id meets 7 of the 10 principles of Heuristic Usability. It is hoped that the results of this study will be input for the developer to improve the application and its user interface.

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Introduction:-

Currently, the use of electronic applications as a means to assist humans in solving problems is inevitable. It can be said that almost all aspects of human life involve the use of applications from education, home and office work, commerce, communication, health, entertainment and so on. One of the things that is influential because of the rapid development and use of internet technology. Since HTML was introduced by Tim Bernes Lee in 1990 which can be said to be the forerunner of today's web-based applications, its development continues to increase. Through kompas.com, according to data from NetCraft until 2021, there were around 201 million actively monitored websites where in 1994 the number of websites was only around 3000 [1]. Where currently recorded internet users in the world reached 4.95 billion people as of January 2022 [2]. Based on adminschool.net, the advantages of the web application itself compared to other platform applications are that it is easy to develop, easy to access, responsive to devices, relatively inexpensive and saves storage [3].

Corresponding Author:- Pualam Dipa Nusantara
Address:- Faculty Member, Computer Science Department, School of Computer Science, Bina NusantaraUniversity.
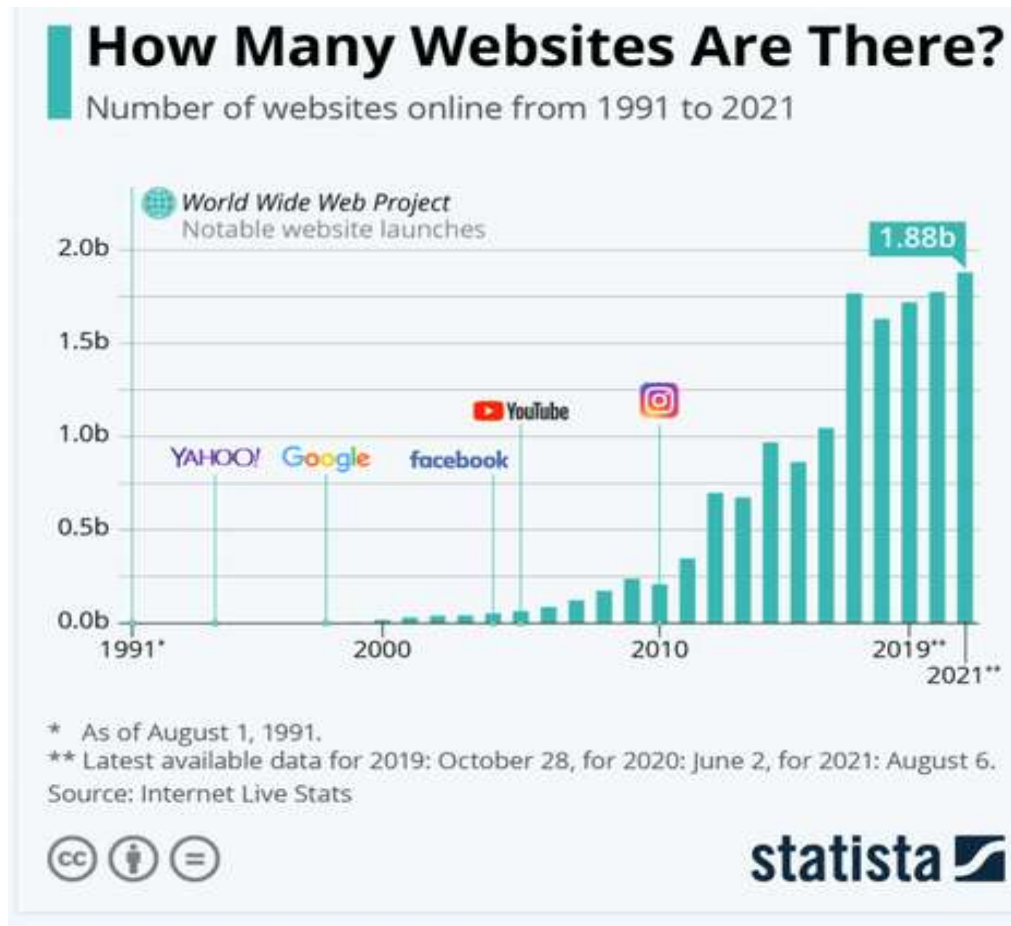
Figure 1:- Statistic of Web Application 2021 [1].

Web applications were originally a collection of static web pages that contained data and information. This static web page can only appear permanently whoever accesses it. In its development, web pages can appear dynamically, which is able to appear changing thanks to a database that is connected to a web application. Users can interact dynamically looking for what is needed in the application. The development of a web application can be said to be quite easy. The number of tutorials and programming languages that are relatively accessible allows many web application developers. According to a survey conducted by the developer forum site stackoverflow.com, the PHP programming language is one of the most widely used programming languages with Javascript, HTML/CSS, Python, Java and several other programming languages that can also be used to develop web applications. PHP programming language itself is a programming language that is easy to learn and was developed to build dynamic web applications [4].
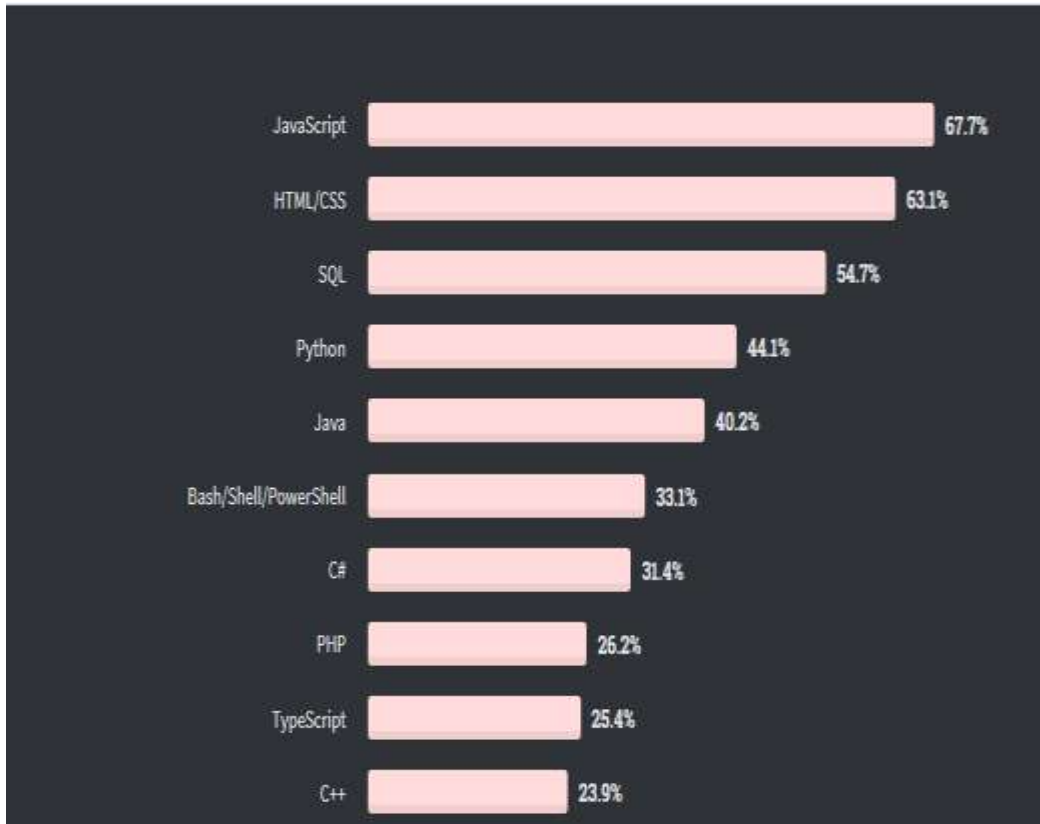
Figure 2:- Statistic of Popular Programming Language [5].

Along with the increasing number of web applications today, the quality of these applications is something that needs to be considered. The quality of the web application itself is related to the quality of the application whether it is in accordance with the expected goals [6]. This can be reflected in the satisfaction of application users [7]. However, in reality, quality assurance is not always available [8].

So the purpose of this study is to determine the quality of web applications using the principles of Heuristic Usability.

Methodology:-
Heuristics comes from the origin of the word "eureka" in Greek which means "find" closely related to art and science related to an invention. The heuristic method proposed by Jakob Nielsen itself can be considered a broad "rules of thumb" for the usability of web applications [9].

There are 10 principles of usability heuristics that can be applied [10], namely:
1. Visibility of system status
A condition where the design must always provide information to the user about what is going on, through appropriate and timely feedback. For example when writing a password.
2. Match between system and the real world
The design must provide information that is easily understood by users such as using everyday language and easy-to-understand concepts. This is done to give the impression of familiarity and trust for users.
3. User control and freedom
Able to provide convenience and freedom to users in using the interface to avoid errors that may occur. Examples such as users who can do undo, redo, and others. When a user accidentally deletes an email, the user can undo the message.
4. Consistency and standards
A consistent and good design will make it easier for users to use the available features. Consistency can be applied also in language, writing words, navigation, and so on. While the standard in question is about the platform of the

system. For example, when you want to develop a mobile application, you must follow existing standards or instructions.

5. Error prevention

Error cases or bugs are often found when using the system and this condition is unavoidable. However, with good design it can prevent users from making mistakes. For example, when you want to tweet on Twitter, the "tweet" button will not be clicked before the user writes the text.

6. Recognition rather than recall

Minimizes user recall by making elements, actions and options visible to the user. Create an application design that allows users to recognize the design pattern that was created so that they can continue to use the application without having to remember the steps to take afterward.

7. Flexibility and efficiency of use

This point emphasizes that the system should provide flexibility and efficiency in use. Example of using shortcuts.

8. Aesthetic and minimalist design

Design views should not contain irrelevant and rarely needed information. The existence of irrelevant information will compete and interfere with important information and the visibility of necessary information to users. Therefore, some simple things such as choosing colors and placing the right position must be considered carefully.

9. Help users recognize, diagnose, and recover from errors

Error messages should be written in plain language (no code), indicating the problem, and then suggesting solutions. For example, when registering on a website or application, you must fill out the form correctly. When an error occurs during charging (before sending), the system can show the error and suggest a solution.

10. Help and documentation

The system must have relevant documentation and good "help" features, so that users can learn everything related to the system.

Evaluation and Measurement

Evaluation of the study was conducted on the web application sinta.kemdikbud.go.id using the Heuristic Usability methodology with a simple measurement of application compliance with the principles of Heuristic Usability. A value of 1 is given if it meets and a value of 0 is given if it does not meet.

Result And Discussion:-

Sinta.kemendikbud.go.id is one of the websites owned by the Indonesian government under the Ministry of Education and Culture which is intended to provide easy access to citations of researchers in Indonesia. This application is an important part for researchers in Indonesia, especially for lecturers who are required to conduct research. Of course, the quality of the web is an important concern considering the thousands of research results indexed in applications that must be easily accessible to users.
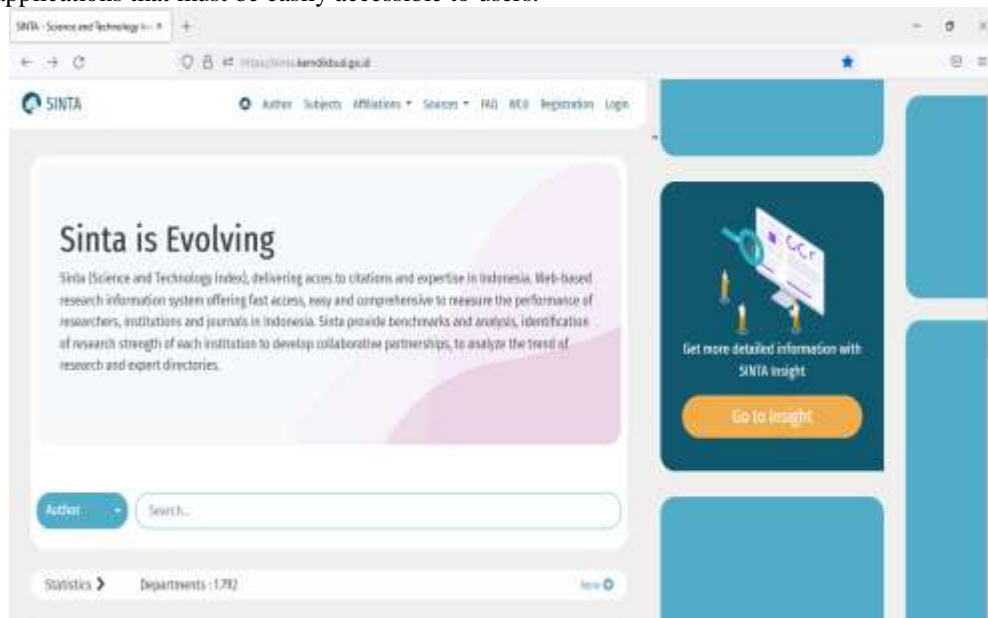

Figure 3:- Home Page [11].

The measurement results using the Heuristic Usability principle can be described as follows:

1. Visibility of system status

In this section, it can be seen that the system provides a clear status, for example assigning page numbers to the amount of data displayed.
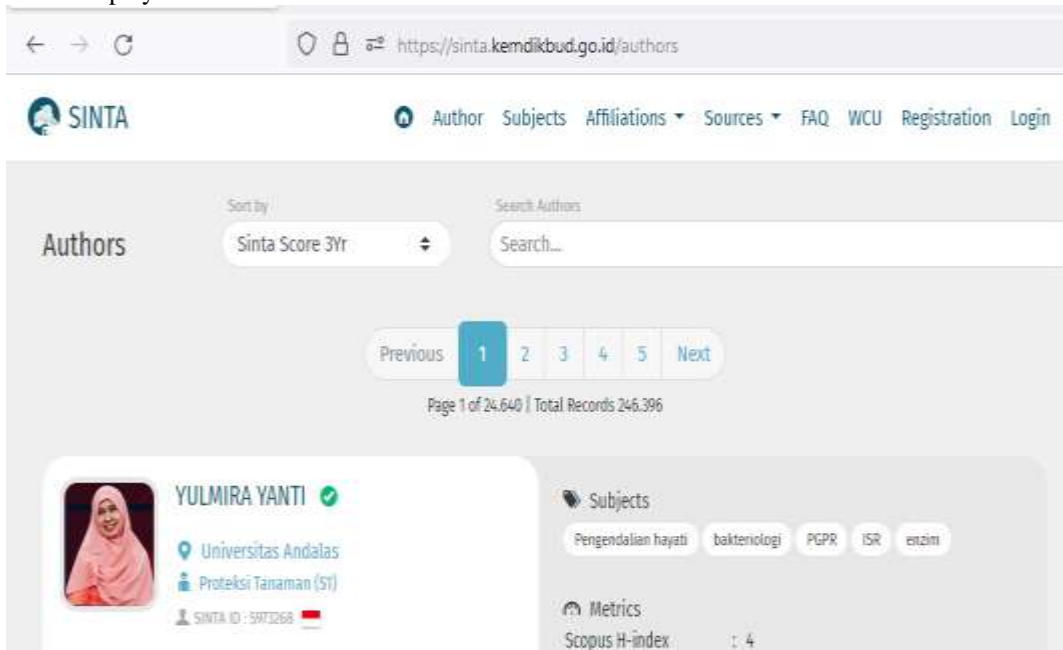

Figure 4:- Authors Page [11].

2. Match between system and the real world

This principle is seen in the use of terms and icons used in the navigation menu reflecting concepts that are easily recognizable in everyday life.

Figure 5:- Navigation Menu [11].

3. User control and freedom

Users are given the freedom to determine what next steps they want to take. The example below shows the use of the Paging feature which can help users move pages one by one or go directly to the desired page.
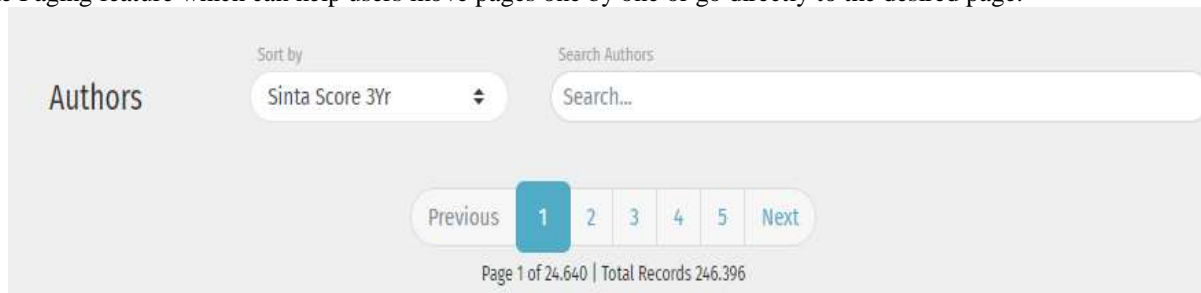

Figure 6:- Paging Control [11].

4. Consistency and standards

The use of terms consistently or developing applications according to certain standards will make it easier for users to use the application without the need to ask whether the term refers to something that is already understood or something else. For example, the term FAQ refers to a list of frequently asked questions.
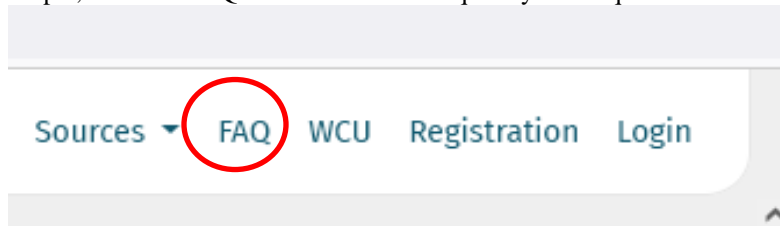
Figure 7:- FAQ Menu [11].

5. Error prevention

The error prevention section can be seen on the login page. When the user clicks the login button without filling in any data on the form, a login failed message will appear. This message appears for a few seconds then disappears. In addition to the message that disappears quickly, the reason for the login failure is not clearly visible in the message.
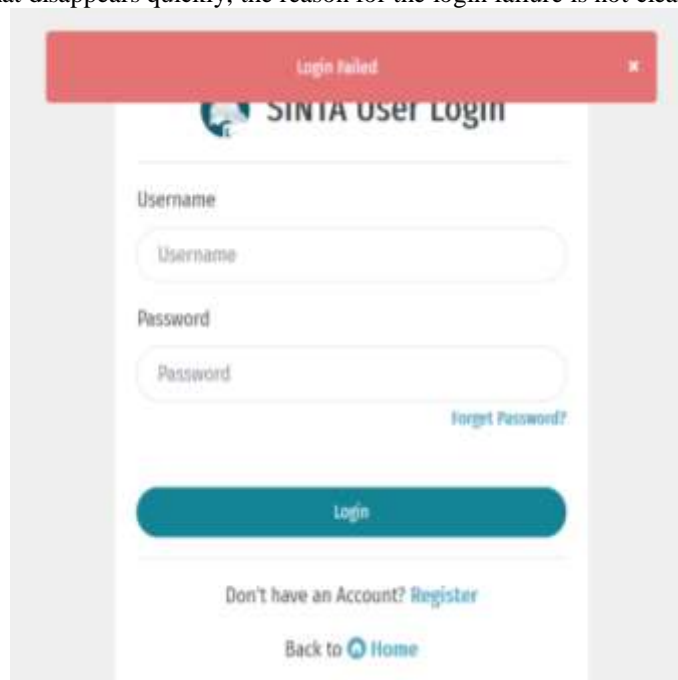
Figure 8:- Login Page [11].

6. Recognition rather than recall

In this section, the application provides clarity on all elements in the web page, both naming menus, sub menu options with all the options that are easily recognizable so that users do not need to remember every action taken.
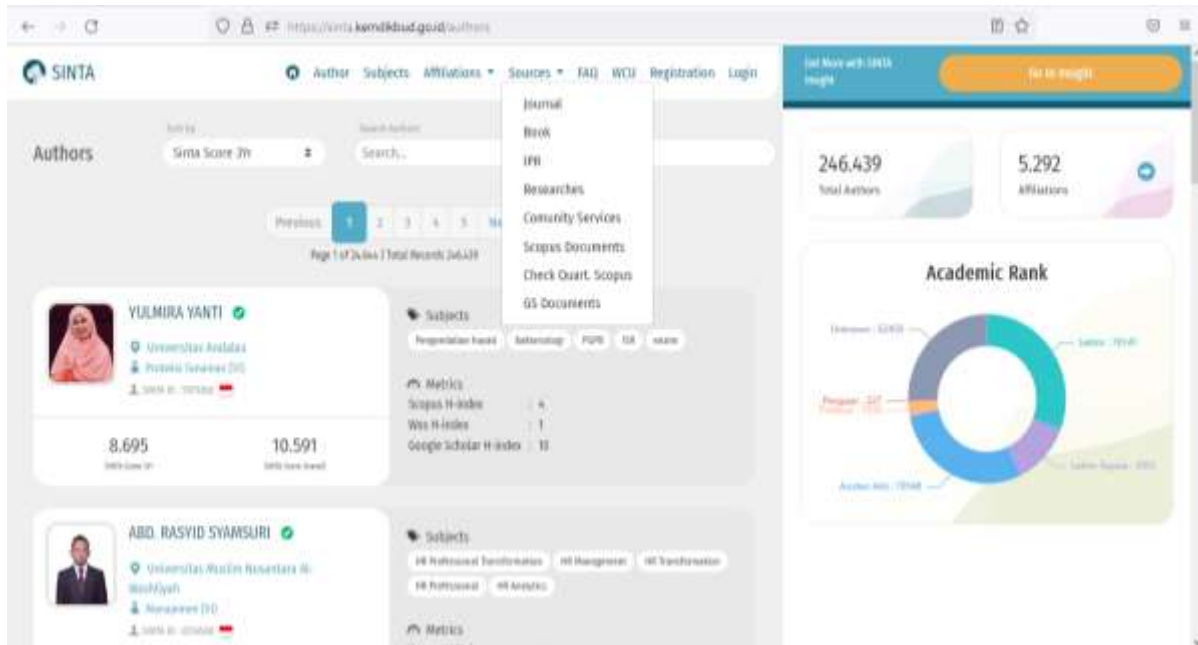
Figure 9:- Dropdown Menu [11].

7. Flexibility and efficiency of use

At this point the provision of shortcuts to speed up user work including functions for personalization and customization is not visible on this application.
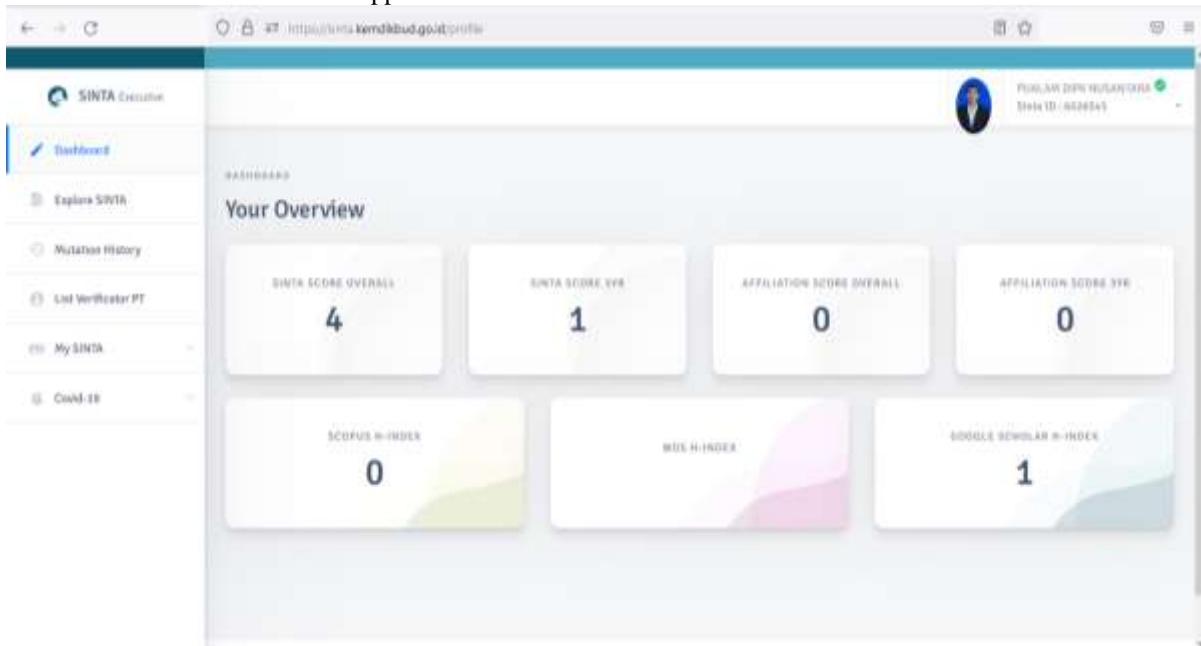

Figure 10:- User Dashboard [11]

8. Aesthetic and minimalist design

In this principle, the sinta.kemdikbud.go.id website provides an appropriate design by presenting the information needed for users.
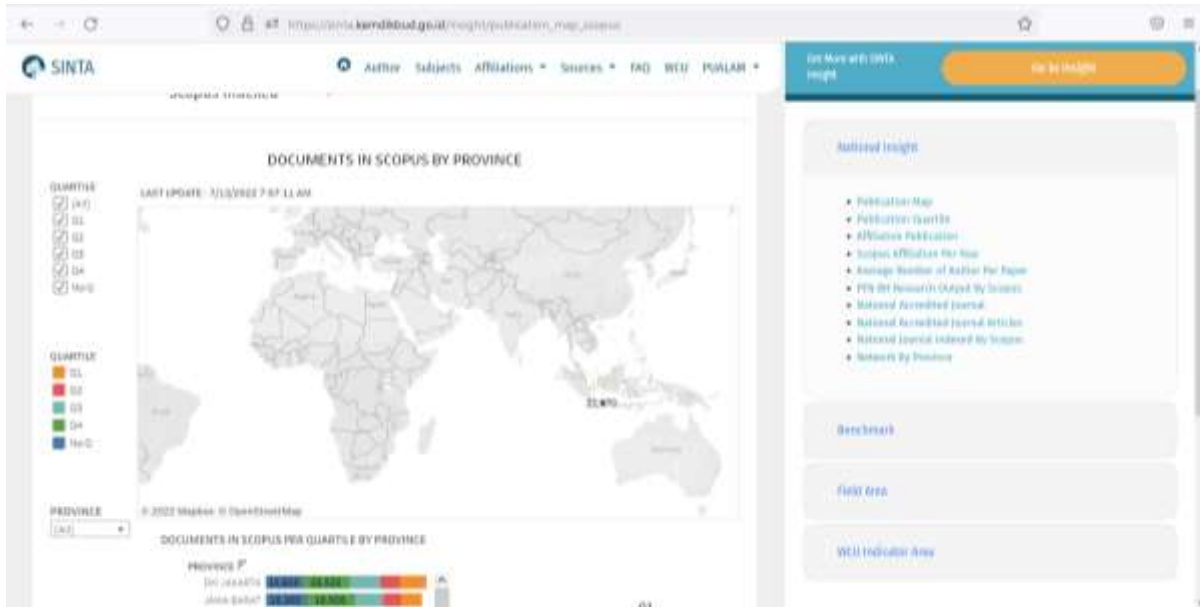
Figure 11:- Publication Distribution Details Page [11].

9. Help users recognize, diagnose, and recover from errors

At this point can be evaluated through the login page. The result is that when the user enters the wrong email or password the system displays an error message. It's just that the message displayed is not clear what error occurred and the contents of the form page disappear so that the user cannot review the error.
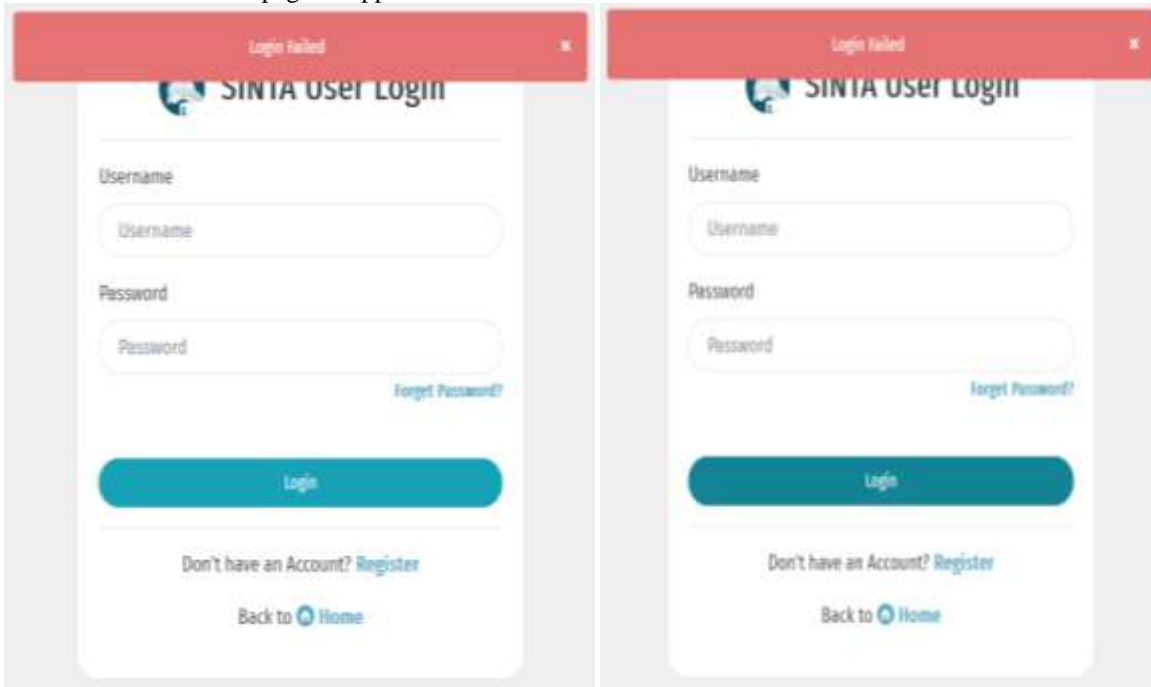

Figure 12:- Username and Password Error Message [11].

10. Help and documentation

The sinta.kemdikbud.go.id website provides assistance on how to use the application. Although the system is easy to use but it can help the user to use all the features in the application.
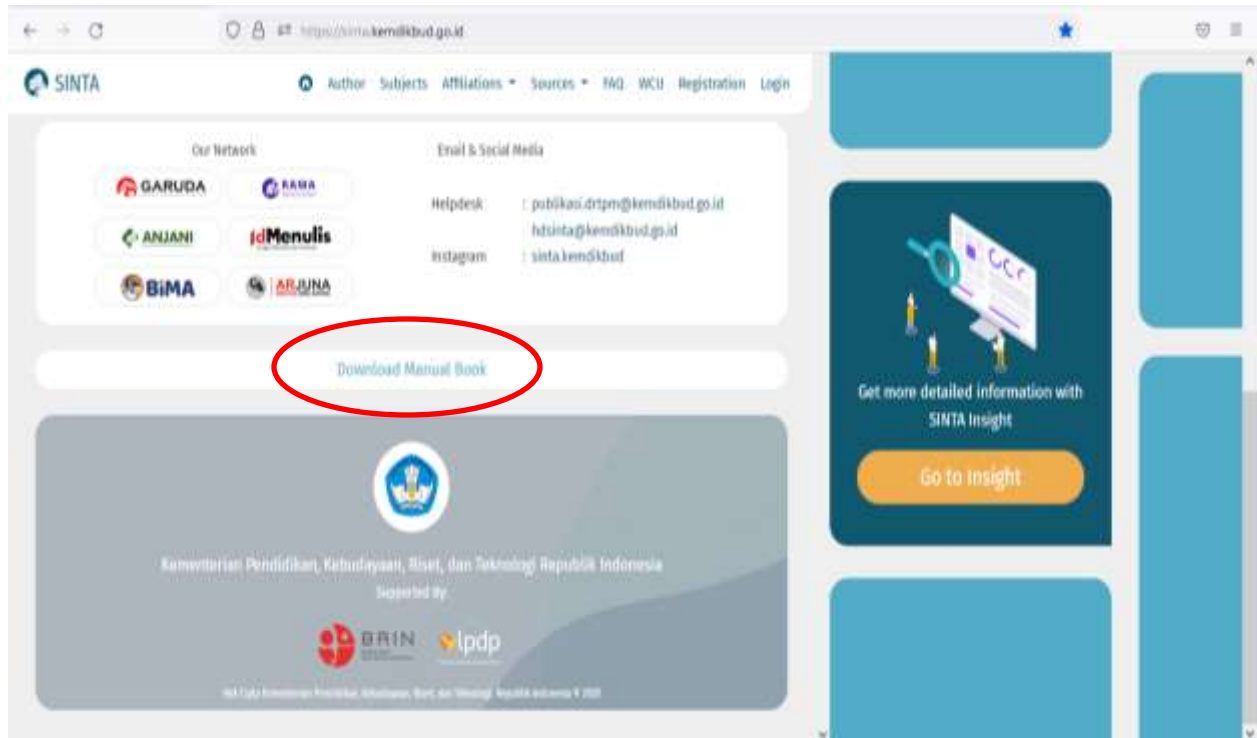
Figure 13:- Download Manual Book Section [11].

The results of the assessment carried out on the sinta.kemdikbud.go.id web application can be seen in the table below:

No.	Faktor Heuristic Usability	Memenuhi
1	Visibility of system status	1
2	Match between system and the real world	1
3	User control and freedom	1
4	Consistency and standards	1
5	Error prevention	0
6	Recognition rather than recall	1
7	Flexibility and efficiency of use	0
8	Aesthetic and minimalist design	1
9	Help users recognize, diagnose, and recover from errors	0
10	Help and documentation	1

Table 1:- Evaluation and Measurement Result.

Conclusion:-
From the explanation above in this study, it can be concluded that the website sinta.kemdikbud.go.id fulfills 7 of the 10 principles of Heuristic Usability. This can be input for the developer to evaluate for further application development.

As considerationfor further studies a deeper evaluation can be carried out by involving users and experts to carry out assessments and measurements. Apart from usability, the performance of the application itself can be used as one of the supporting elements in measuring the quality of web applications.

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