Usability Analysis of *Tembang Sekar Alit* Learning (SekARAI) Applications Using The Human Computer Interaction (HCI) Model In Bali Students

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Abstract

Bali is an area known for its artistic and cultural wisdom, one of which is *tembang*. Along with the development of the *tembang* learning era, there has been a shift from using conventional learning media until now it has developed to interactive learning media based on information technology, especially learning *Tembang* Bali. The purpose of this study was to perform Usability Testing of the Sekar Alit song learning application called SekARAI (*Sekar Alit* Recognition using Artificial Intelligence). Usability Testing needs to be done to find out in advance the possible problems in using the application that will be faced by the user. Usability is measured by five criteria, namely: learnability, efficiency, memorability, errors, and satisfaction, which consists of 18 questionnaire questions.
The application of the concept of HCI (Human Computer Interaction), especially usability testing on the SekARAI (*Sekar Alit* Recognition using Artificial Intelligence*)* application for students in the city of Denpasar which is based on user opinions shows that the learnability indicator is the aspect that has the highest assessment, with a value of 4.21, memorability is the most important aspect. has an assessment with a value of 4.18, the third satisfaction indicator with an assessment of 4.17, Efficiency is the fourth indicator with an assessment of 4.03 and an indicator of errors with a value of 3.93.

Keywords
Usability, Balinese *tembang*, Human Computer Interaction (HCI)

1. Introduction
Bali is one of the islands that has a unique culture that has been recognized by the world. Bali is an area known for its artistic and cultural wisdom. *Tembang* is a sound art that is built from a variety of tunings and tones as ingredients. Along with the development of the era of *Tembang* learning, there has been a shift from using conventional learning media until now it has developed to interactive learning media based on information technology, especially the learning of *Tembang* Bali. Learning media can be applied in all subjects, including subject matter in Balinese students. One of the existing uses of information and communication technology has been widely used in the education sector, especially for universities and government (Setiawan and Widyanto 2018).

Likewise, information systems are aimed at helping human life so that jobs that were difficult, time-consuming and labor-intensive can be done more quickly and easier with an information system. The information system is built with certain conditions that must be met so that the information system can be said to be successful. These conditions include easy to use, safe, effective and efficient. Information systems that do not meet these requirements can be said that the information system is not successful. When building an information system, a system designer or developer

must pay attention to human and computer interaction factors, because information systems are made by humans and their goals are also for humans. Human computer interaction (HCI) is a discipline that studies communication or interaction between users and the system. The main role of HCI is to produce a system that is useful, safe, productive, effective, efficient and functional (Luo et al. 2018).

Problems that often arise in interactions between humans and computers are the frequent occurrence of misperceptions by humans (users) of existing software, so it is not the effectiveness and efficiency of work that is obtained, but instead causes difficulty using the software. Another problem is that the software is too complex, making it difficult to learn, the software does not fit the user's needs and does not or does not accommodate the needs that are important to the user. Problems that occur as a result of implementing the system are avoided by applying the HCI concept properly. HCI (Human Computer Interaction) focuses on user system design or what is commonly referred to as user center design (UCD). So, it is necessary to evaluate the applications that have been implemented. This evaluation will later be useful to find out how effective and efficient of SekARAI (*Tembang Sekar Alit* Learning) is for users (Zarish 2019). This evaluation will also be very useful, as one of the bases for developing an Android application that is owned, if in the future it will add several features. Evaluations that can be done to determine the extent to which the use of a technology or application is carried out, one of which is to use usability analysis. Usability is part of Human Computer Interaction science. which focuses on studying interface design and interaction between humans and computers (Al-omar 2018). This usability study will discuss the user experience in learning and using certain technologies, applications or websites (Sauer et al. 2019).

By paying attention to the user, a system that is suitable and appropriate for the user can be created. The right system for users will provide convenience to users in using the system, thus the purpose of implementing the system will be achieved and will not experience failure. Whether or not a system is suitable with users can be determined by conducting an analysis of the system's usability. The Sekar Alit Recognition using Artificial Intelligence (SekARAI) application is an android-based and web-based server-side software created using the MFCC (Mel Frequency Cepstrum Coefficients) method used to perform feature extraction, namely to obtain a parameter and information about the characteristics of a person's voice and Matching the training voice pattern to the sound being tested will use the DTW (Dynamic Time Warping) method. The target of testing the analysis of the usability of the information system carried out by researchers on Balinese literature students who have taken the subject matter.

1.1 Objectives

The objective of this study was to perform Usability Testing of the Sekar Alit or *pupu*h song learning application called SekARAI which is one way to find out whether the user can easily use the application, how efficient and effective an application can help the user achieve his goals and whether the user is satisfied with the application. used. Usability Testing needs to be done to find out in advance the possible problems in using the application that will be faced by the user.

2. Literature Review

2. 1 Usability Study

The study of usability is part of the multi-disciplinary field of Human Computer Interaction (HCI). Human Computer Interaction is a field of science that has been developing since 1970 which studies how to design a computer screen display in an information system application so that it is comfortable for users to use (Said 2016). Usability comes from the word Usable which generally means to be used well. Something can be said to be useful well, especially failure in its use can be eliminated or minimized as well as providing benefits and satisfaction to users (Rubin and Chisnell 2008). Usability refers to how users can learn and use a product to achieve its goals and how satisfied they are with its users. The usage context consists of users, tasks, equipment (hardware, software and materials).

2.2 Usability Measurement by Use Questionnaire

The questionnaire that can be used to measure usability is USE (Usefulness, Satisfaction, and Ease of Use). There are several aspects of usability measurement according to Ido, namely efficiency, effectiveness and satisfaction. Several studies that have been conducted show that most product evaluations refer to three dimensions. The results of several observations also show that there is a correlation and mutual influence between the parameters of ease of use and usefulness. The usefulness factor is usually less important if the system is an internal system where the user is mandatory (Qashlim, Prahasto, and Gernowo 2014). The questionnaire is made in the form of a five-point score with a Likert scale model, to measure the level of user approval of the statement of the measurement results then processed

by descriptive statistical methods and analysis is carried out either on each parameter or on all parameters. Use is a non-commercial questionnaire package that can be used to research the usability system. According to Nielsen (1994), usability is a quality attribute that describes or measures how easy it is to use an interface. The word "usability" also refers to a method for increasing ease of use during the design process (Nielsen and Mack 1994). Usability is measured by five criteria, namely: learnability, efficiency, memorability, errors, and satisfaction. Learnability measures the level of ease of doing simple tasks when you first encounter a design. Efficiency measures the speed at which a particular task is performed after studying the design. Memorability looks at how quickly the user regains proficiency in using the design when it returns over time. Errors looks at how many errors users have made, how serious they are, and how easy they are to resolve. Satisfaction measures the level of satisfaction in using the design (Said 2016).

2.4 *Tembang*

Tembang is a part of art that is expressed in the strains of sound, rhythm and rhythm by using the pelog or slendro tunings. This can stir the heart or feelings of the listener. The existence of *tembang* in Bali has existed since pre-Hindu times, while signs of singing activity have existed since the reign of King Ugrasena around the year 818 caka or 846 AD As contained in the Buleleng inscription in 896 AD, it mentions the *tembang* as "Pegending" (Budiyasa and Purnawan 1997). During the Singasari and Majapahit Kingdoms, many songs were created and had a new form called kidung. Kidung is not bound by the song teacher as the conditions contained in Parwa or Kekawin. Furthermore, in the XVI - XX centuries a new type of song was born, namely Macepat. This macepat song generally uses subtle Balinese language and is bound by ole uger-uger (rules) padalingsa and ding-dong.

According to experts in the art of kerawitan, especially *tembang*, macepat is older than kawin. After the influx of Indian Hinduism and the process of acculturation of culture, especially in the field of literature.

2.5 *Pupuh or Sekar Alit*

Sekar alit is also called macapat or *pupuh*. Macapat in Javanese means a system for reading *tembang* rhymes on four-to-four syllables. Macapat song in Bali is often called *pupuh* which means a series of songs (Budiyasa and Purnawan 1997). *Pupuh* in Bali is known as the original macapat, such as *Pupuh Sinom, Pupuh Semarandana, Pupuh Pangkur, Pupuh Pucung, Pupuh Ginada, Pupuh Ginanti, Pupuh Durma, Pupuh Maskumambang, Pupuh Dandanggula, and Pupuh Mijil. Pupuh* which are arranged in a story is called geguritan. However, then some new pupuh came from the kidung, such as Jurudemung (Demung), Gambuh, Magatruh, Tikus Kapanting and Adri. Recently, several geguritan appeared which had several themes, namely Geguritan Tamtam, Geguritan Basur, Geguritan Ni Sumala, Geguritan Pakang Raras, Geguritan Durma, Geguritan Sucita and so on.

2.6 *Sekar Alit* Recognition application using Artificial Intelligence (SekARAI)

Sekar Alit Recognition using Artificial Intelligence (SekARAI) is a software or palication of Balinese *tembang* learning, especially the type of *sekar alit* or *pupuh* made with artificial intelligence algorithms, namely the MFCC (Mel Frequency Cepstrum Coefficients) method used to perform feature extraction namely to obtain a parameter and information about the characteristics of a person's voice and matching the training voice pattern to the voice being tested will use the DTW (Dynamic Time Warping) method. Artificial Intelligence is a part of computer science that makes machines (computers) do work as well as humans do (Kusumadewi 2003). The voice of the student as the singer of the song *sekar alit* will be automatically verified by SekARAI for its correctness according to the sound of the program that is already on the system which can be installed on a mobile device connected to an audio data processing server. Another feature of SekARAI is that there is a *tembang* text that is divided into each stanza with the size of the *tembang* text that can be enlarged according to the user's wishes.

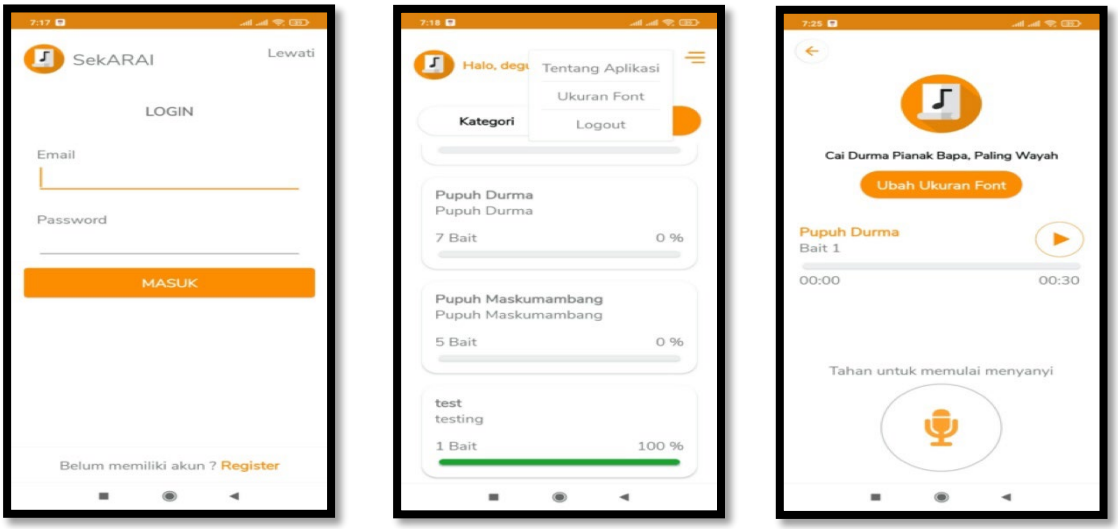

Figure 1. SekARAI application menu display

3. Methods

This type of research used in this research is an evaluation survey. The evaluation survey method is a survey to evaluate the implementation of a program. The method used is a summative evaluation method. Sumantive evaluation is carried out to examine the achievement of the objectives of a program and is usually carried out at the end of the activity of the implementation of a program. The program under study in this case is to examine the level of effectiveness or practicality of the results of the development of the *Sekar Alit* song learning application or what is called SekARAI which is intended for learning media for the *Sekar Alit* song for students in Bali (Said 2016).

The design in research begins with identifying problems, followed by conducting initial studies, namely literature studies / literature studies related to usability testing and also studies of the object to be observed, in this case the *Sekar Alit* Recognition application using Artificial Intelligence (SekARAI). The research design can be seen clearly in Figure 2 below:

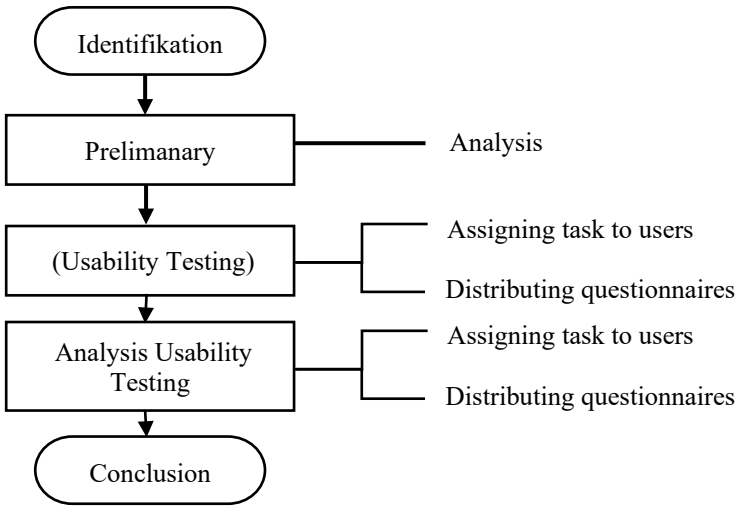

Figure 2. Research Design

The research steps began by designing an information systems analysis model that touched the scope of Human Computer Interaction and involved the five criteria from Jacob Nielsen (Nielsen and Mack 1994). The steps presented are as follows:

1. Choosing an object, this step is the process of determining the object to be studied, namely, the application of *Sekar Alit* Recognition using Artificial Intelligence (SekARAI).
2. Selecting respondents for filling out the questionnaire based on the level of active, skilled and lay users.
3. Presenting the task to the respondent, this step is to provide an explanation to the respondent that it is not the respondent who is being tested but the object of the research and provides an explanation of how the process of filling out the questionnaire.
4. Giving assignments to respondents, namely giving assignments in the questionnaire to be answered by respondents
5. Filling out the questionnaire from the respondent, the respondent gives the answer to the questionnaire given according to what was experienced by the respondent.
6. Analysis of answers from respondents to the SekARAI application in terms of respondents' answers
7. From the evaluation carried out, you will get complete information about the advantages and disadvantages of the SekARAI application using usability testing techniques.
8. Creating an evaluation report.

4. Data Collection

The qualitative data collection method is carried out by distributing questionnaires through survey media to obtain data. According to Sugiyono (2004) the Likert scale is used to measure the attitudes, opinions, and perceptions of a person or group of people about social phenomena which is a bipolar continuum scale, at the end of the left (low number) describes an answer that is negative. While the end of the right (high number), describes a positive answer (Sugiyono 2011).

The population that is the object of this research is all students of Balinese literature at Udayana University, totaling 270 college student. While the research sample amounted to 50 consisting of university students and college students taken using a purposive sampling technique that is based on a certain consideration made by the researcher himself based on the characteristics or characteristics of the population that have been known previously.

These considerations use a restriction method based on inclusion and exclusion criteria. The inclusion criteria in this study are selecting respondents who aged 20-22 years (respondents who the first semester of lectures), health Controlled by choosing students who have a healthy status or with other words do not suffer from one or more from the disease that is not having the disorder health conditions such as high blood pressure, deafness, blindness, back and neck pain, because someone is sick will be easily affected by environmental effects. While the exclusion criteria are not willing to be a respondent, currently sick during the study and not present at the time of research.

The Likert scale is designed to convince respondents to answer at various levels to each question or statement item contained in the questionnaire. The data about the dimensions of the variables analyzed in this study are aimed at to respondents using a scale of 1 to 5 for get ordinal data and are given a score as follows :

Tabel 1. Skala Linkert

QS	SDA	D	NAND	A	SA
Score	1	2	3	4	5

Information :
QS : Questionnaire Statement
SDA : Strongly Disagree
D : Disagree
NAND : Neither Agree Nor Diagree
A : Agree
SA : Strongly Agree

Table 2. Coding and Questionnaire Statement Items

Indikator	Code	Questions on the Questionnaire
Learnability (A)	(A1)	The SekARAI application can be learned easily
	(A2)	Easily and quickly receive detailed information and also specific to the SekARAI Application
	(A3)	I am able to easily understand the content and content of that information presented on the SekARAI Application
	(A4)	I am able to easily grasp and understand the flow of navigation in the SekARAI Application
	(A5)	Without written instructions or manual books, I was able to learn use of the SekARAI Application
Memorability (B)	(B1)	I can easily remember using the SekARAI App
	(B2)	I can easily know and remember the navigation direction and features on the SekARAI App
	(B3)	I find it easy whenever using the SekARAI App
Efficiency (C)	(C1)	I was able to access the menu in the SekARAI application quickly
	(C2)	I can easily get the relevant information SekARAI application
	(C3)	I was able to immediately find the information / song that I wanted to search from the first time I opened the SekARAI application
Errors (D)	(D1)	I did not encounter any errors while using the SekARAI application
	(D2)	I did not find the menu that was error or not in accordance with its function
	(D3)	I was able to find the features and menus I was looking for in the SekARAI App
Satisfaction (E)	(E1)	I am happy with the overall interface design of the SekARAI application
	(E2)	I feel comfortable using the SekARAI application
	(E3)	The combination of colors and content layout is comfortable to look at
	(E4)	The SekARAI application is in accordance with my expectations, when I see the title on the system page.

Source : (Sukmasetya, Setiawan, and Arumi 2020)

4.1 Data Analysis Technique

The data analysis in this research is qualitative data analysis. Qualitative data analysis is an analysis process that is based on the existence of a semantic relationship between the variables being studied (Sugiyono 2011). The purpose of qualitative data analysis is that the researcher gets the meaning of the relationship between the variables so that it can be used to answer the problems formulated in the study. In this study, the analysis carried out was the semantic relationship between the SekARAI application variable and the HCI variable. The measurement of the validity and reliability of the HCI application instrument in the SekARAI application used the Alpha Crobach technique using SPSS for Windows Version 25.0 to process data.

5. Results and Discussion

5.1 Results of the Analysis of the Validity Test of Measuring Instruments

In distributing questionnaires, this research uses purposive sampling method (Tongco 2007) to obtain respondents. Which means, the researcher determines the requirements related to the intended respondent in advance. The conditions imposed in this study are the users of the SekARAI application, in this case, the users of the Balinese *tembang* learning application, especially *Sekar Alit*, who is a student of the Bali Literature Study Program at Udayana University. Before the questionnaire was distributed, two tests were conducted first. Namely the validity test using a legibility test which was carried out by randomly selecting ten prospective respondents to see to what extent the statements in the questionnaire could be understood by the prospective respondents. Furthermore, the reliability test is carried out whether the draft questionnaire will be distributed is reliable or not. In carrying out the reliability test, using the help of SPSS version 25 software.

Table 3. The Results of the Questionnaire Instrument Reliability Test

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
0,590	0,591	18

Table 2 shows the results of the reliability test carried out, from the test it was found that Cronbach's alpha was 0.934, which means that the statement was accepted. After the questionnaire is confirmed to be valid and reliable, then the questionnaire is distributed using the google form electronic page within a span of three weeks to get responses from predetermined respondents. The time span used to get the respondents was two weeks. From the results of distributing questionnaires, it was found that 50 respondents had filled in and rated the SekARAI application. Table 3 shows the distribution of the sample of respondents who entered and rated the SekARAI application.

Table 4. Number of Respondents Samples

	Gender	**Frequency**
Valid	Man	23
	Women	27
	Total	50

The validity test is carried out again after all data from respondents have been collected, this is necessary to determine and test the strength of the conclusions and inferences from the test results to approach the truth (Sarwono 2013). This test is done by knowing r count from the existing item value. If the calculated r value> the r table value, then the group question can be considered "Valid" (Rohman and Kurniawan 2017). The value of r Table in this study is 0.284 which is obtained from the table r significance for two-way testing with a value of 0.05 and with n-2 degrees of freedom, it can be said to be valid.

Table 5. Validity Test Results

Variable	Code	R	Sig	Information
Learnability (A)	A1	.473**	.001	Valid
	A2	.538**	.000	Valid
	A3	.522**	.000	Valid
	A4	.662**	.000	Valid
	A5	.670**	.000	Valid
Memorability (B)	B1	.625**	.000	Valid
	B2	.638**	.000	Valid
	B3	.722**	.000	Valid
Efficiency (C)	C1	.768**	.000	Valid
	C2	.588**	.000	Valid
	C3	.835**	.000	Valid
Errors (D)	D1	.635**	.000	Valid
	D2	.634**	.000	Valid
	D3	.632**	.000	Valid
Satisfaction €	E1	.567**	.000	Valid
	E2	.567**	.000	Valid
	E3	.576**	.000	Valid
	E4	.613**	.000	Valid

It can be seen that the correlation between each item of the usability instrument against the total score A1 to E4 on the total score of each shows a significant result. Where is the Sig. (2-tailed) each item is smaller than alpha 0.05 which proves that all construct instrument items are valid.

5. 2 Usability Testing

After the validity test is carried out, descriptive statistical calculations are carried out to see the results of the usability testing carried out. In this descriptive statistical calculation, the average results of usability testing carried out on the SekARAI application are then divided into five categories and ranges of assessment. Table 6 shows the categories and rating ranges of the SekARAI Application.

Table 6. Total Average of Each Usability Indicator

Variable	Code	Average	Average / indicator
Learnability (A)	A1	4,08	4,21
	A2	4	
	A3	4	
	A4	4,18	
	A5	4,46	
Memorability (B)	B1	4,16	4,18
	B2	4,14	
	B3	4,24	
Efficiency (C)	C1	3,74	4,03
	C2	4,06	
	C3	4,3	
Errors (D)	D1	3,64	3,93
	D2	3,88	
	D3	4,26	
Satisfaction (E)	E1	4	4,18
	E2	4,2	
	E3	4,06	
	E4	4,44	

Table 6 shows the total average result of each indicator from the usability assessment carried out. From these results, the SekARAI application shows that the learnability indicator is the aspect that has the highest assessment, with a value of 4.21 which means that it is in a fairly good range. It can be said that users can be interpreted that users of the SekARAI application find the android application easy to learn, both in terms of the flow and navigation provided by the android application. Continued in the second rank, memorability is an aspect that has an assessment with a value of 4.18, which means that it is in a fairly good range. It can be said that users can easily remember and know the usage of the SekARAI application, and not only that, without manual books or manuals for use, users can still run the SekARAI application according to its function.

Next is the third satisfaction indicator with a rating of 4.18 which is also in the quite good category. Overall using the SekARAI application, users feel that the design and interface provided by the android application makes users feel comfortable. In addition, user expectations are met when using the SekARAI application. Efficiency is the fourth indicator with a rating of 4.03 which means it is also in a fairly good range. Users find it easy to get the information they want to find just by looking at the home page on the android application. Not only that, users also feel able to do many activities (access) in a fast time. The last one is an error indicator with a value of 3.93 which is still in the pretty

good category. In overcoming existing errors, the SekARAI application is considered by users to be able to provide certain notifications if an error occurs. But for some cases, users often encounter errors without notification. This is what causes the user experience from the point of view of facing existing errors.

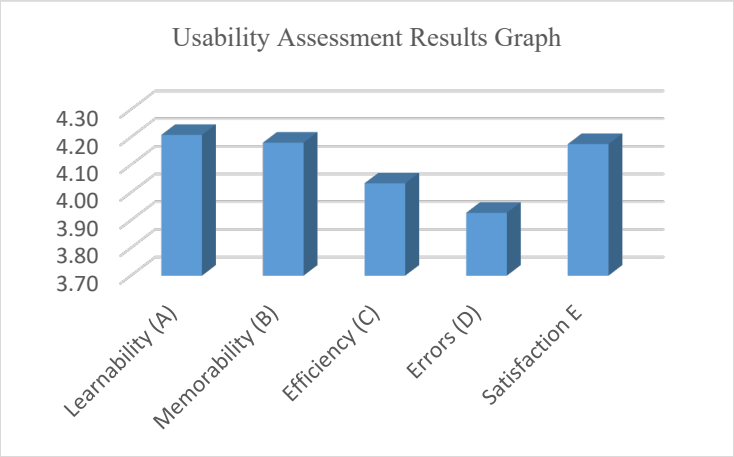

Figure 3. Usability Assessment Results Graph

6. Conclusion

The application of the concept of human computer interaction (HCI), especially usability testing on the SekARAI application for students in the city of Denpasar, which is based on user opinions, shows that SekARAI has implemented the criteria of learnability, memorability, efficiency and satisfaction well, but has shortcomings in the error handling side. The test results show that the learnability indicator is the aspect that has the highest assessment, with a value of 4.21, memorability is the aspect that has an assessment with a value of 4.18, the third satisfaction indicator is with an assessment of 4.17, Efficiency is the fourth indicator with an assessment of 4.03 and the error indicator with a value of 3.93. The errors indicator, SekARAI has a moderate error level because it does not provide facilities to assist users in correcting errors, processing the audio to the server, but the resulting output is accurate. The level of user satisfaction with SekARAI is quite good, but the help and feedback facilities to help users use the system are not yet available. The results of the Usability Value Recap show that all attributes have a usability acceptance value by the user, the average is above the value of 3, so it can be said that the SekARAI application software that has been created has a Usability aspect value and is very easy to learn and understand by users. The SekARAI application software that has been made has met the majority of usability aspects so that it can be implemented by Balinese literature students in Denpasar.

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