DESIGN OF I-SLA (ISLAMIC LEARNING APPLICATION) AS TAJWEED LEARNING MEDIA BY USING THE SPEECH RECOGNITION TECHNOLOGY

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ABSTRACT

Indonesia is a country with the majority of the population converting to Islam, which is more than 87% of the total population of Indonesia. As Muslims who adhere to the teachings of Islam, the teachings that must be understood are tajweed lessons. Tajweed science is the science that studies how to read the Qur'an properly and correctly. Adherents of Islam in Indonesia are still many who do not understand and cannot read the Qur'an properly and correctly. Research noted that there are still about 65% of Indonesian Muslims still blind to the writings of the Qur'an. The importance of learning tajweed science is that it can read precisely, if there are errors in reading the Quran can change its true meaning. Tajweed lessons are commonly obtained through non-formal educational institutions that focus on learning Islam. The current pandemic period causes all learning activities to be limited and difficult, including learning al quran education. Online learning applications today are still rare that develop Quran Education including tajweed science, so people who want to learn the science have not found the right tools. We are planning an application called I-SLA (Islamic learning application). I-SLA is a tajweed learning application that utilizes speech recognition to correct the pronunciation of the user's Quran and provide justification if in pronunciation there is still something wrong, this technology has the ability to exchange information using acoustic signals. In addition, there is a consulting feature of tajweed experts if they feel they want to deepen tajweed knowledge. The design of the application in this study was carried out in a direct manner. The mechanism of this research is made by conducting a literature study for the process of making software needs specifications, followed by the creation of software design with UI / UX, followed by the creation of applications and closed with testing. This process is carried out continuously in accordance with the planning period. The result of this study is the application of I-SLA (Islamic Learning Application) with the aim of users of children, adolescents, and adults who want to deepen tajweed science to improve its pronunciation.

***Keywords**: pronunciation, tajweed science, speech recognition, learning application*

PERANCANGAN I-SLA (ISLAMIC LEARNING APPLICATION) SEBAGAI SARANA APLIKASI BELAJAR TAJWID AL-QUR'AN DENGAN SPEECH RECOGNITION

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ABSTRAK

Indonesia adalah negara dengan mayoritas pupulasi adalah orang islam, yang mencapai lebih dari 87% dari total populasi di Indonesia. Sebagai muslim yang menganut agama islam, tajwid adalah salah satu pelajaran yang harus dipahami. Ilmu tajwid adalah ilmu yang mempelajari bagaimana membaca Al-Qur'an dengan baik dan benar. Pemeluk agama Islam di Indonesia masih banyak yang belum paham dan belum bisa membaca Al-Qur'an dengan baik dan benar. Penelitian mencatat bahwa masih ada sekitar 65% umat Islam Indonesia yang masih buta terhadap tulisan-tulisan Al-Qur'an. Pentingnya mempelajari ilmu tajwid adalah dapat membaca dengan tepat, jika ada kesalahan dalam membaca Al Quran dapat merubah makna yang sebenarnya. Pelajaran tajwid umumnya diperoleh melalui lembaga pendidikan nonformal yang fokus pada pembelajaran agama Islam. Masa pandemic pada saat ini, menyebabkan aktivitas belajar mengajar terbatas dan sulit, termasuk juga pendidikan belajar Al-Qur'an. Aplikasi pembelajaran online pada saat ini masih jarang yang menyajikan topik terkait belajar Al-Qur'an. Sehingga terkadang orang yang ingin belajar masih belum dapat menemukan aplikasi yang tepat. Penelitian ini merancang sebuah aplikasi dengan nama I-SLA (Islamic Learning Application). I-SLA adalah aplikasi belajar tajwid yang menggunakan pengenalan suara untuk memperbaiki cara membaca Al-Qur'an pengguna dan menyediakan media

untuk mengoreksi pelafalan yang tepat dalam membaca Al-Qur'an. Teknologi ini memiliki kemampuan untuk bertukar informasi dengan menggunakan sinyal akustik. Selain itu, aplikasi ini juga memiliki fitur untuk berkonsultasi dengan pakar tajwid. Perancangan aplikasi I-SLA dilakukan secara langsung. Mekanisme penelitian ini dibuat dengan melakukan studi literatur untuk proses pembuatan spesifikasi kebutuhan perangkat lunak, dilanjutkan dengan pembuatan desain perangkat lunak (perancangan antarmuka dan interaksi), dilanjutkan dengan pembuatan aplikasi dan ditutup dengan pengujian. Proses ini dilakukan secara berkesinambungan sesuai dengan periode perencanaan. Hasil dari penelitian ini adalah aplikasi I-SLA dengan pengguna utama adalah anak-anak, remaja, dan dewasa yang ingin mendalami ilmu tajwid dan meningkatkan pengetahuan dalam pelafalan Al-Qur'an.

***Kata Kunci**: pelafalan, ilmu tajwid, pengenalan suara, aplikasi pembelajaran*

I. INTRODUCTION

TAJWEED is a component of science which is the basis for how to read the Qur'an properly and correctly. It is a measure for every letter which is pronounced by qari '(reader), because every letter of the verses of the Qur'an has its right [1]. Errors in reading the Qur'an result in a change in true meaning. Learning tajweed science must be understood by every Muslim. Indonesia is the country with the largest Muslim population of 87%, but unfortunately 65% of them still do not master how to read the Qur'an properly and correctly [2] [3]. Tajweed learning needs to be done face-to-face not only through writing media, this is because it will affect the technique of reading the Qur'an. Tajweed science education is a branch of religious science that is still not too much to be cared for, even though the number of Indonesian Muslims who need to learn tajweed is very large, and tajweed science is a science that must be studied every year from an early age. But currently, there is a pandemic covid-19 that causes all online learning activities.

The technology that is being developed today is an online learning digital application. The purpose of this digital-based education application is to support education in times of pandemics that continue to run even through laptop screens and devices. But this application only focuses on general education such as mathematics, science, language, and others. In pandemics, all fields of education are affected both from public and religious education. But very few digital-based education applications provide religious education. On the other hand, there is technology to process the user's voice, namely speech recognition is a powerful tool for the exchange of information using acoustic signals [4].

The application that has existed to learn tajweed science is only limited through writing to introduce haruf and reading in the Qur'an. This is still lacking, because users do not know how to read the Quran properly.
Therefore, we have an application that can help study tajweed and improve its reading. Therefore, we have an innovation application I-SLA (Islamic learning application). The I-SLA application was created to improve the quality of Reading the Qur'an for users by utilizing speech recognition and Islamic Teacher Consultation feature as superior features juxtaposed with similar applications that mostly only prioritize tajweed science database features. With the speech recognition feature, users are able to test the suitability of pronunciation in reading the Qur'an. In addition, with the consultation feature on teachers, users can also inquire about Tajweed further. The I-SLA application is aimed at Muslims who are still illiterate of the Qur'an. The user's goal of this application is to introduce tajweed science to children and adults to adjust reading and consult tajweed experts.

II. METHODOLOGY

There are some researches about speech recognition. Reza Lotfidereshgi et.al., proposed the speech recognition to identify the emotional state of speaker [5]. This research combined the strengths of the classical source-filter model for human speech with Liquid State Machine (LSM) that is inspired from biological spiking neural network (SNN) and resulted very good classification performance. Huijuan Zhao et.al., conducted a short review of speech recognition's research that was implemented in age and gender recognition [6]. This research investigated and map the methodology in the feature extraction, corpus usage, and model selection. This also summarized the current main result of the research, issue, and research future work.

The other research from Naveen implemented speech recognition to identify the gender [7]. This research used Voice Activity Detection to avoid capturing the noise surrounding. The accuracy of the model developed is 92%, and it can be used in transcription platform and other smart voice devices. From the literature review conducted, many of speech synthesis research use English language. The research using non-English language in speech recognition is not as many as the research using English language. For Arabic speech synthesis, there are researches from Samira Klaylat et.al., [8], A. Al-Abdullah et.al., [9], Zine Oumaima et.al., [10], Ahmed B. Ibrahim et.al., [11] and Reem Hamed Aljuhani et.al., [12]. This research implemented speech recognition for many topics i.e. emotion

detection, phoneme recognition, and speech corpus for text to speech synthesis.

This paper focuses in developing an application that integrates the speech recognition technology to learn Qur'an tajweed. In the development process, there needs to be supporting tools and the right methods so that later the application that will be developed can run more optimally. The equipment used in this study itself includes 2 parts, namely, hardware and software.

A. Materials

In the development of this research, there needs to be supporting tools and the right methods so that later the application that will be developed can run more optimally. The equipment used in this study itself includes 2 parts, namely, hardware and software.

1) Hardware

Hardware used in the development of this application can be a Personal Laptop that has a specification of drinking memory RAM of 8 GB and a hard drive of 200 GB.

2) Software

As for the software used for the development of this application will include the Operating System, UI / UX Design Software, Programming Language, Android Editor Software, and Application Database.

a. Figma

Figma is a cloud-based design and prototype software that makes it easier for users to access software while collaborating for a project at the same time.

b. Jawa

Java is one of the programming languages where it supports cross-platform different platforms. With java programming language a programmer will be easier to run a program on a grumbling compatible with the java programming language. This can happen because java programming language is a large network-based development language.

c. Android Studio

Android Studio is an IDE (Integrated Development Environment) for android-based application development that has an open source, free, and official nature. Android Studio itself was first officially launched by Google on May 16, 2013, to support the ide development of the previous android application, Eclipse. Even so, Android Studio was developed like IntelliJ IDEA contained in Eclipse, namely ADT (Android Development Tools). Android Studio has several features including:

1. Has a project grande build base
2. Faster bugs are fixed
3. Tools that can monitor the compatibility, speed, and nervousness of the application quickly.
4. Security support with App-signing and Proguard
5. Easy GUI
6. Support with Google Cloud platform

d. MySQL

MySQL has functions for relational database management systems (RDBMS) that have open source properties and a better performing and faster database server that is easy to operate with embedded systems. In other words, MySQL is a database management system (DBMS) where users can more easily demonstrate the process of data replication.

B. Method

The methodology used to develop the system is described as follows.

a. Data Collection

Data collection is carried out to complement the innovation of this application through various methods including literature research, documentation, and observation; Literature research is conducted by studying literature, journals, books, and seminar magazines relevant to our innovations. Documentation is done by collecting data from various sources based on documents that are secondary sources such as the internet. Finally, observation takes place through direct observation of events in our environment in connection with education.

b. Requirement Specification

The requirement specification is conducted to specify the requirement to develop the application. In this step some functionalities are defined. The data collection result will be analyzed and mapped into some requirements. These requirements will become the feature for the application developed.

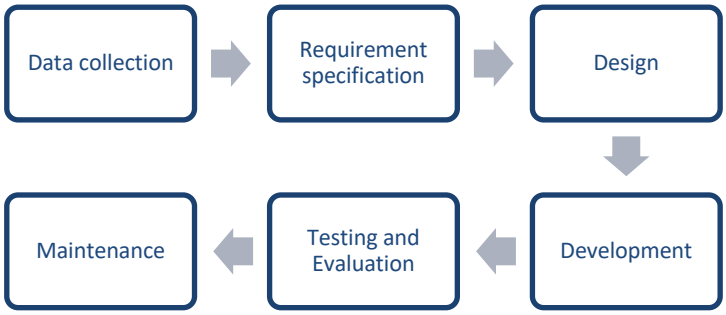


Fig. 1. Software Development Process to Develop I-SLA Application.

c. Design

The goal of the UI/UX design process is to create a prototype of an ISLA application that can be the basis during the application design phase to facilitate program execution. According to Jenny Ruiz, mentioned that the prototyping process for system developers aims to obtain information about user reactions to the system through user interaction with the prototype developed [13].

Because the prototype is enough to describe the original version of the actual system. Teppei Okamoto also mentioned m that the reason the prototype was designed was because the prototype could be easily added or reduced, depending on the development process [14]. Another advantage, with this process can also save more funds and resources. Design methods can be made as best as possible especially based on previous information gathering. The resulting design is not only in the form of graphic design but in interactive design so that it can be easily utilized by users.

d. Application Development

I-SLA applications are programmed in the Java programming language. Java code is compiled collectively with the application's desired data records, where the procedure is packaged by a tool called the "APT Tool" into an android bundle that will generate files with apk extensions. Apk file is what will be called the application, and later the application can be run through a mobile device. In the process of designing this application there are several stages that are carried out, namely:

1. System plan and layout of Form Sign Up and Login for users.
2. System design and main page layout.
3. System design and menu layout features such as, Speech Recognition and Teacher Consultation

e. Testing and Evaluation

At this stage, testing the capabilities and features of the I-SLA through an Android prototype is run offline. Not only that, at this stage the results of the trial will be evaluated. The results of this evaluation are what will be used to improve and improve I-SLA in order to be of character as needed.

f. Maintenance

This stage is done aimed at maintaining the I-SLA application if there is a Bug or Error in the application. Not only that, with the maintenance of the application, the application can experience the addition of other features and the database of the I-SLA application can also be more regular.

III. Result and Discussion

According to language (ethimology), Tajweed is to beautify something. Meanwhile, according to the term Tajweed is remove each letter from the place of its exit (makhraj) by giving its rights. The right of the letter is the original property that is always with the letter. While in general, tajweed is a science that teaches about how to read the Qur'an properly and correctly. The purpose of tajweed is to protect the reading the Qur'an from errors and changes.

Reading the Qur'an is one of the worships in Islamic Teachings. Good and correct reading the Qur'an is one of the conditions for the perfection of prayer. Rasulullah SAW said: "Those who recite the Qur'an proficiently will one day have a place in Paradise with the noble Messengers. Whereas people who read the Qur'an but are not proficient, read it stunned and not fluent, he will get two rewards ". (History of Bukhari and Muslim from St. Ayisyah ra.)

Basically, as Muslims we must understand the importance of studying tajweed in the Qur'an. This understanding must be done in order to know the procedures for reading the Qur'an with fluently, tartil, the length of the reading lafazh, and the characteristics of the letters. Many Muslims are new to learning the Qur'an so they do not understand how to read the Qur'an properly. In fact, Muslims who have studied the Qur'an for a long time sometimes still make

mistakes in reading the Qur'an. Currently, the science of recitation is widely studied using books so that the science of recitation seems difficult and classic to learn. Therefore, an innovation is needed so that the science of recitation can be studied by various groups and ages of Muslims, namely the creation of a digital-based application design called I-SLA.

I-SLA (Islamic Learning Application) is a digital-based religious education application that aims to improve the ability to read the Qur'an in the field of recitation. This application was created specifically to provide education to the public about how to read the Qur'an correctly according to tajweed. I-SLA provides many benefits for the community, including providing an understanding of learning recitation correctly, providing opportunities for Muslims to learn how to read the Qur'an properly and correctly, and being used as a means of learning the Qur'an through features that have been developed. This application has 2 main features, including the Speech Recognition feature and the Islamic Teacher Consultation feature. The speech recognition feature is used to assist users in pronouncing the readings of the Qur'an in accordance with the correct tajweed, starting from the display of types of reading laws, such as the law of reading dead, mim dead, mad, and qalqalah. In addition, pay attention to the pronunciation of the recitation of the Qur'an which must be pronounced correctly. In this feature, users can record the recitation of the Qur'an readings in real time where the system will correct automatically if there are pronunciation errors. While the Islamic Teacher Consultation feature is used as a counterweight to the speech recognition feature. In this feature there is a consultation and question and answer session between the user and the teacher about the science of recitation in the Qur'an. Users can contact tajweed consultants in several ways, using direct messages or video calls.

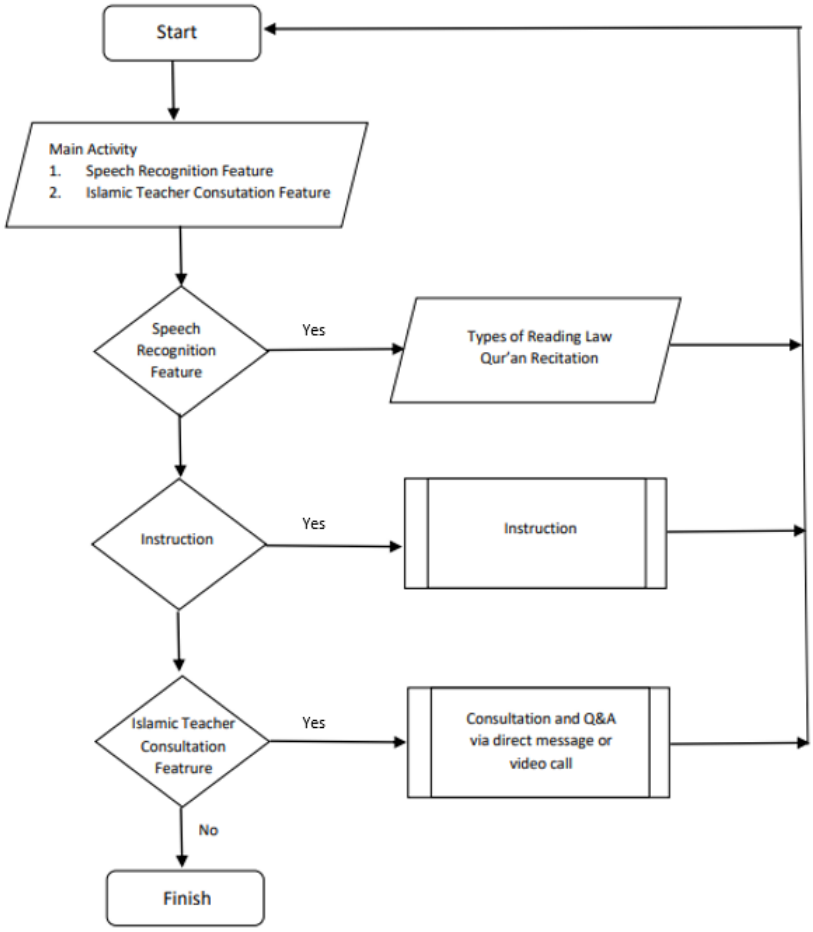


Fig. 2. Flowchart of Application Developed.

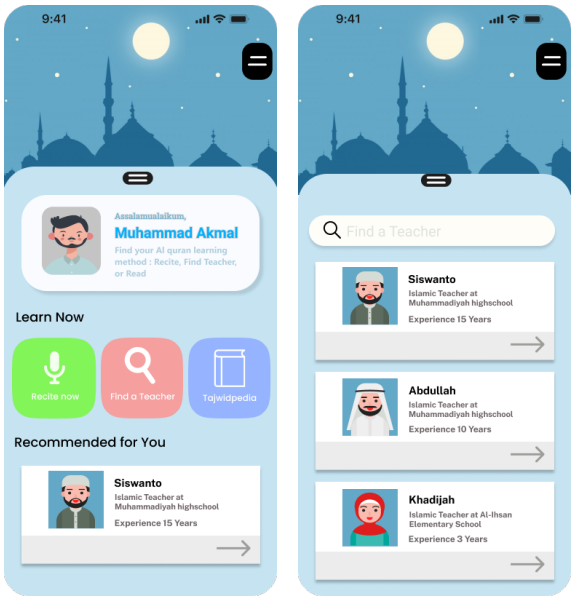
I-SLA can be used on both Android and iOS. Broadly speaking, we carry out several stages of the application development process, including discovery (the process of finding ideas according to the problem at hand), designing (Using UI and UX), development (Application development process), stabilization (The process of improving application quality, in the form of stages prototype, alpha, beta, and release candidate phases), and distribution (application marketing process). The method we use to market our application will create branding so that people know and understand the purpose of making the I-SLA application, market the I-SLA through online and offline media, and conduct outreach to the community with the aim of conveying education about the importance of using

this application, in collaboration with partners who have relationships with Al-Qur'an learning institutions.

Figure 2 illustrates the process flow on the main menu. Before the main menu page is shown, the application will show the cover page (Figure 3.a). If the user decides to learn now, the application will load the login page (Figure 3.b). The main menu shown in Figure 4.a, consists of Speech Recognition Feature, Instruction, and Islamic Teacher Consultation Feature. The Islamic Teacher Consultation Feature is shown in Figure 4.b.

(a) (b)

Fig. 3. (a) The Cover Page of I-SLA (b) The Login Page of I-SLA.



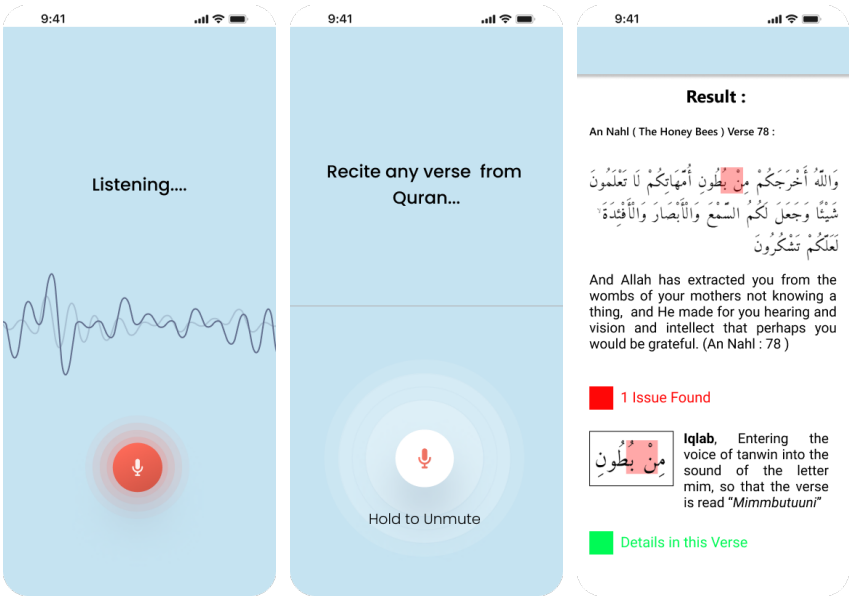
(a) (b)

Fig. 4. (a) The Main Menu Interface (b) Page to Find a Teacher.

If the Speech Recognition Feature is selected, the Types of Reading Use menu will appear which includes the display of types of reading laws, such as the law of reading dead, mim dead, mad, and qalqalah and reciting the reading of the Qur'an. The speech recognition feature will identify the audio (Figure 5.a and Figure 5.b). Then the result will be shown in the next page illustrated in Figure 5.c. In the Figure 5.c. is shown the surah in Al Qur'an and some issues found from audio.

If the instructions menu is selected, instructions for using the application will appear. Furthermore, the Islamic Teacher Consultation Feature menu contains consultation and question and answer sessions between users and teachers about the science of recitation in the Qur'an via direct messages or video calls. User testing was conducted

to measure the reliability of the application. There are six questions in the questionnaires explained in Table 1.



(a) (b)

Fig. 5. (a) The Main Menu Interface (b) Page to Find a Teacher.

TABLE I
QUESTIONNAIRES FOR THE USER TEST.

No	Question
User Interface	
Q1	There is no label, button, or input field overlap
Q2	Labels and instructions are written informative and understandable
User Experience	
Q3	The application can run well, without any error, bug, or fault
Q4	I found any errors, bugs, or faults when I run the application
Q5	The documentation helps the user understand the feature of the application
Q6	I will recommend this application to other users, especially those who want to learn tajweed

The questions in Table 1 are classified into two indicators, i.e., user interface and user experience. The user interface indicator relates to anything visualized in the application, and the user experience relates to anything that interferes with the experience of the user such as error, bug, or fault, and the documentation to help the user use the application. There are ten participants in this user testing. The Linkert scale is used to measure the participant's response. Figure 5 describes the results of user testing. Q1 to Q6 means the question number based on Table 1. The average score for the User Interface indicators is 4,6. This means that the result is good enough. The user experience score is higher than the user interface score. This means that there is not found any errors, bugs, and faults. For further development, the color scheme, and icon used in the user interface can be improved. Besides, a new interaction design can be proposed to improve the user experience, i.e., hijaiyah letter writing by using handwriting or detecting the hijaiyah letter by using the camera.

IV. CONCLUSION

ISLA is designed to facilitate the user learn to read the Qur'an properly and correctly using speech recognition technology. In addition, this application provides guidance features directly to its experts, so that this application can make it easier for anyone who is interested to explore tajweed science. ISLA application can be developed by combining formal learning applications, so that online learning not only contains general knowledge but there is also knowledge about the science of reading the Qur'an. This application has the potential to become a big start-up. Because of the number of the large Muslim population. For further research, a new interaction design can be

proposed to improve the user experience, i.e., hijaiyah letter writing by using handwriting or detecting the hijaiyah letter by using the camera. So, the user does not only learn the tajweed by using speech recognition, but also learns how to write the hijaiyah letters correctly.

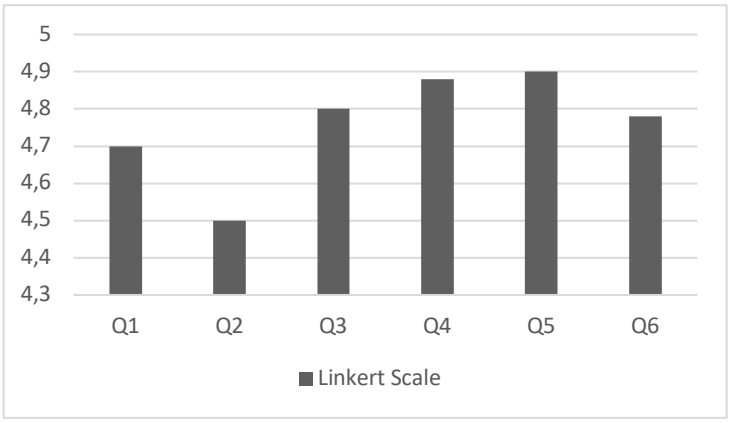


Fig. 6. The Average Score of User Test Results.

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