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As a solution during COVID-19, mandarin language learning system development to support HSK certification exams

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Abstract

The COVID-19 epidemic has prompted an increase in self-study; as a result, preparation for HSK Certification exams should also be stepped up. The Hanyu Shuiping Kaoshi (HSK) Exam can be taken either digitally or on paper. Students taking an exam through the internet are not limited by time or location when taking the test. The HSK test is designed to objectively and accurately assess a student's level of proficiency in Mandarin Chinese. Examinees' comprehension of the HSK exam's material and the quantity and quality of time spent working through sample HSK questions both play a role in whether or not they pass the exam. In order to help test takers prepare for the HSK, an online practice exam system is required. The primary goal of the online artificial HSK examination system is to allow prospective examinees to attempt to replicate the HSK test through the system and receive the same outcomes as the provisions of the genuine HSK exam. As one of the coordinators of the HSK exam in East Java, Nurul Jadid Probolinggo put this medium through its paces with a group of high school pupils. This article discusses issues of user approval of the program in addition to the analysis of its features

Keywords: Design and Development; HSK Simulations; Learning Management System; E-learning, e-certification

1. Introduction

Mandarin is becoming increasingly popular as a second language among individuals all over the world. Since 2008, it is projected that 40 million people all around the world have taken up learning Mandarin as a second language [1]. It would appear that an increasing number of people are sitting for the HSK examination in order to obtain the HSK certificate, which is a valid certification of one's proficiency in the Mandarin language. The HSK examination was initially developed in 1984, and in 1992 it was formally designated as the national standard examination [2]. Since 2013, almost five million people from all over the world have taken the HSK exam. While the number of pupils studying HSK has increased by a factor of three every year. These individuals hail from a variety of cultural upbringings and educational experiences [3].

Because of the global COVID-19 pandemic, school systems all over the world have been compelled to look for alternatives to traditional face-to-face instruction. Because of this, there has been an explosion in the number of instances in which students and teachers engage in online teaching and learning. The Hanyu Shuiping Kaoshi, more commonly known as the HSK, is a standardized examination of language competency for individuals who are not native speakers of Standard Chinese. The epidemic has also had an effect on the HSK examinations, and a large number of students have been forced to adjust to new methods of studying.

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The HSK test is run by Hanban, which is the abbreviation for the Confucius Institute Headquarter. Hanban is a non-governmental institution that is linked with the Ministry of Education in the People's Republic of China. This examination's development and administration are under Hanban's purview. In order to successfully administer the HSK test [1.] Hanban has worked closely with a variety of educational institutions located all over the world. There have been more than 120 countries that have taken part in organizing the HSK test, and Indonesia is one of such countries. The HSK tests in East Java are coordinated by a number of universities in that region, both public and private, that offer programs in the education of Chinese language speakers [4]. In addition, certain high schools in East Java, such as SMA Nurul Jadid Probolinggo, are also responsible for administering the HSK exams. In order for their students to fulfill the requirements for grade advancement or graduation from the school, they must pass HSK levels 2, 3, or 4. The HSK can be completed either digitally (using the internet) or manually (using paper and pencil). Every person who takes the HSK test at least must prepare a fee that is not small, around half a million Rupiah. especially in the event that you need to retake the test due of technical issues that occurred during the test [5].

Examinees' graduation from the HSK test is contingent on a number of factors, including the extent to which they have mastered the content and the number of times they have practiced answering exam questions. Understanding Mandarin requires a strong foundation, which is provided through vocabulary material [6]. At each successive level of the examination, you will be expected to demonstrate an increasing level of vocabulary knowledge. Examinees-to-be who practice their skills on HSK questions will, in a roundabout way, strengthen their mental faculties and bolster their self-assurance in preparation for other tests that follow the same format [6]. Candidates can practice taking tests by accessing the sample exams that are made accessible online at a variety of websites around the internet. The candidates' proficiency in Mandarin can be evaluated more accurately by simulating artificial HSK tests at multiple levels, which the candidates should attempt as frequently as possible. There are not many website programs that offer preparation material and practice tests for the HSK exam. Even fewer are those that offer a direct HSK exam simulation feature and that train students in Indonesian. Chinaeducenter.com, www.hskonline.com, Chinesetest.cn, mandarinhouse.com, and mandarinbean.com are just few of the websites that fall into this category. either through the use of Mandarin or English.

In addition to these prerequisites, you will surely also require an online mock HSK exam website program that is geared up with all aspects of the Mandarin examination, whether it be hearing, reading, or writing. The primary objective of this online artificial HSK test application is to make it easier for potential examinees to comprehend the HSK exam's content and simulation by means of a regional website, as well as to provide users with more accurate results [7]. The candidate's level of preparedness for the real HSK examination can be gauged more accurately by increasing the frequency with which they practice the exam simulation. The level of the participants' mastery of the HSK examination material at each level can be illustrated by the score of the simulation results that were obtained by the participants. The program was created using the Waterfall approach [8,] which included the stages of doing a needs analysis, designing the application, putting it into action, and testing it along with performing maintenance. It is intended that applicants, particularly pupils from Nurul Jadid high school, would be able to better prepare for HSK tests and obtain higher HSK graduation scores with the assistance of this medium as an alternative.

2. Literature Study

This research was carried out with the use of preparatory studies from earlier studies, such as OES for University level descriptive tests carried out by Patil, Emmi, and Gajanan [9]. Candidates, such as those studying engineering or medical science, will be able to answer the questions in detail using relevant visuals to support their arguments through the use of a platform called the online examination system (OES), which is based on the Android operating system.

Analysis of the OES was carried out by Hameed and Abdulatif [10]. The Online examination system, sometimes known as OES, is a web-based examination system that facilitates the administration of examinations via the internet. either via the public internet or a private intranet utilizing a computer network. The suggested OES can be easily adopted by universities and high schools, which would make the test more adaptable while also increasing its level of security.

The online examination is one method that can be used to process learning. This method, which is a part of the learning process, is meant to test the level of attainment of a goal of instruction by students in their capacity as learners [11]. issues that arise in decision-making processes that involve several options. The administration of tests via the internet is carried out with the assistance of many facilities, such as exam management, exam management, instructor data management, and students who are responsible for producing output values [12].

3. Methodology and Implementation

The Waterfall System Development Life Cycle model is utilized throughout the process of developing the online application development methodology [13]. This model includes the stages of needs analysis, design, implementation and testing, verification, and system maintenance. The client-server architecture was utilized in the construction of the online mock HSK exam application. Web server tools make use of an amalgamation of AMP (Apache/MySQL/PHP) execution software, which is used in conjunction with the Windows operating system. The client accesses the server through the internet using a browser, and PHP and MySQL on the server are responsible for producing the HSK test simulation as well as storing and returning data from the database. The client utilizes a browser that is linked to the server. [14] The PHP software is a programming script that may be used to develop a module program and the application update process. Both of these processes are executed on the Apache webserver.

4. Discussion

4.1 System Requirement Analysis

The requirement for this simulations HSK exam application system, which includes the necessary content, users, as well as the users' computers and the software and hardware that supports the application. The substance of the HSK exam, the sort of questions that will be asked, the length of time that the test will last, and the intended level of the HSK exam are the components that are required to create the artificial HSK exam system. Table 1 provides information regarding the length of the HSK examination, the total number of vocabulary items, the total score, and the minimum number of correct responses required to pass each level.

Table 1 Duration, Vocabulary, total score and minimum passing score of the HSK exam

Level	Duration	Vocabulary(words)	Total Score	Passing Score
HSK Level 1	40 minutes	150	200	120
HSK Level 2	55 minutes	300	200	120
HSK Level 3	90 minutes	600	300	180
HSK Level 4	105 minutes	1200	300	180
HSK Level 5	125 minutes	2500	300	180
HSK Level 6	140 minutes	5000	300	180

The curriculum for the HSK exam includes vocabulary, as well as hearing, reading, and writing in Mandarin. Types of exams for components, including listening and reading, in the form of multiple-choice questions (MCQ), true or false statements (T / F), and cloze, in addition to more inventive ones such as picture-sentence matching, particularly for levels 1 and 2. The writing test component has been included for participants in the level 3 exam up until level 6. In addition, participants have to demonstrate that they are able to analyze or make conclusions based on the material presented in sentences, paragraphs, or discussions that follow the desired test level. The context of the sentence and the paragraph become more logically consistent the farther one progresses through the levels of the examination [1,3]. The user requirements for this application include visitor participants, registered examinees, contributors to the material, and an administrator who is responsible for managing all of the given modules. While the need for software and hardware in this application employs a minimal standard where the program can be run, the minimum standard is where the application can be run.

4.2 System Design

Use cases, sequence diagrams, and database structure diagrams are the components that make up the system design documentation. In the use case document, application users are differentiated between regular users who only view the content and registered users who carry out the HSK simulation process. Ordinary users only view the content. Users who have previously registered for access to the system are able to access the content, participate in a practice test, and check the results. The HSK exam questions and study resources are created in part by users who contribute to the site. While the Admin is in charge of managing applications, materials, queries, and other users, they are responsible for overseeing the entire process. Figure 1 illustrates, in a general sense, the interaction that takes place between the three

characters in the application. The test simulation consists of the user accessing the application through a browser and then submitting a request. The request is then processed by the application server, which then stores and returns the data (the result of the simulation) from the database.

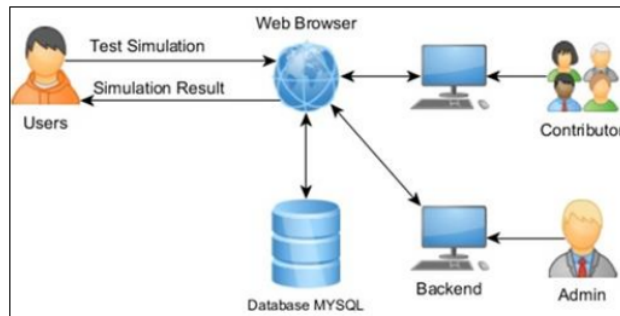


Figure 1 The application workflow responds to user requests

A sequence of HSK exam simulation activities that were performed by registered users is presented in the sequences diagram in the same format as Figure 2 [5].

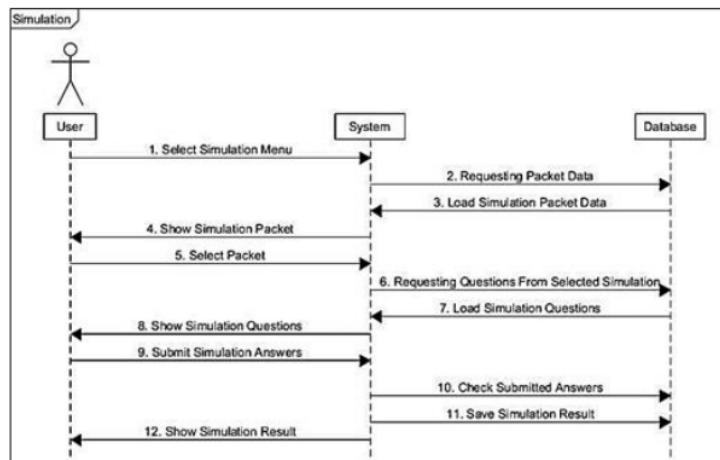


Figure 2 Sequence diagram for the user simulation process

The application database design is comprised of a total of 13 tables, one of which is a question-answer table that is hidden from view in the results of the HSK exam simulation. The registered users, contributors, and administrators are all stored in the user table.

4.3 System Implementation

This simulation, which is required for application to the HSK exam, can be conducted online through a browser. Figure 3 illustrates a generalized schema or application flow diagram for your perusal.

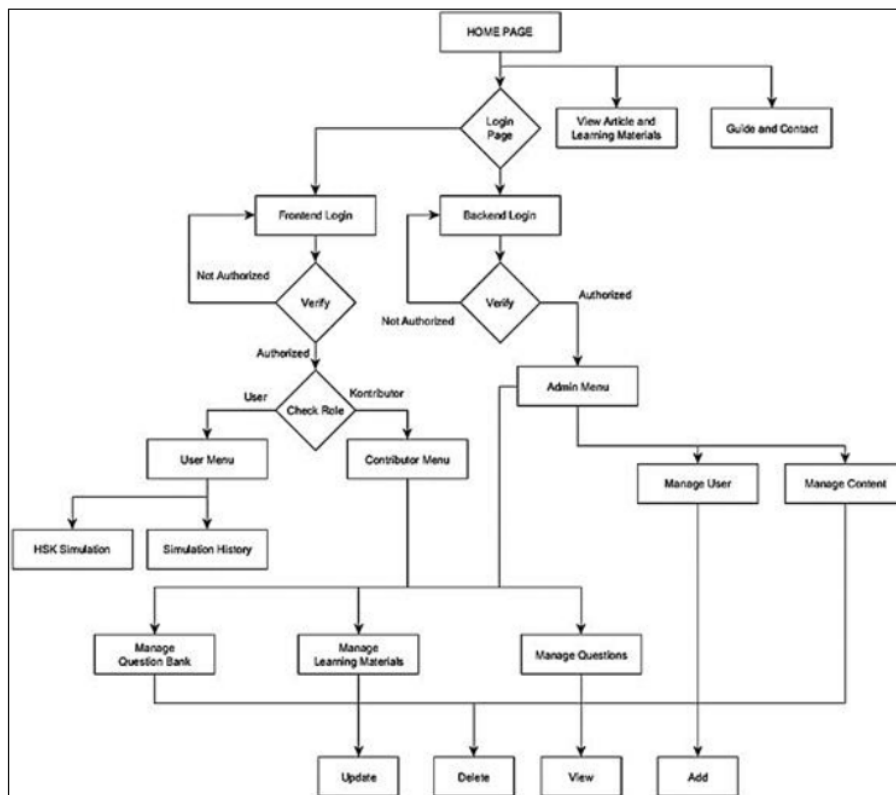


Figure 3 General Schematic of Online Knock HSK Exam

Application modules that can be accessed either by registered users, contributors or admins as application managers are as follows,

- Home (home)
- Theory
- Articles
- Help
- General Guidelines
- FAQ
- Contact
- Signup
- Login

Whereas additional modules for contributors and admins are

- Course management (Admin and Contributors)
 - Vocabulary, manage mandarin vocabulary for each level
 - Reading, Writing, Speaking, managing mandarin material at each level based on reading, speaking and Mandarin writing (Writing) categories
- Question
 - Simulation questions, manage various types of questions based on levels 1 to 6
 - Problem Bank, managing the database of questions based on level
- Content
 - Carousel / Home Slider, manages the appearance of the carousel, by activating or deactivating the home slider.

- Articles, managing articles or news related to Mandarin language material and HSK exams
- FAQ, manage user questions and answers
- Account
 - Edit Profile, manage user profile
 - Logout, exit the application

The main menu display for ordinary users and contributors (frontend) and admin (backend) can be seen in Fig. 4 and 5



Figure 4 Examiner's User Menu

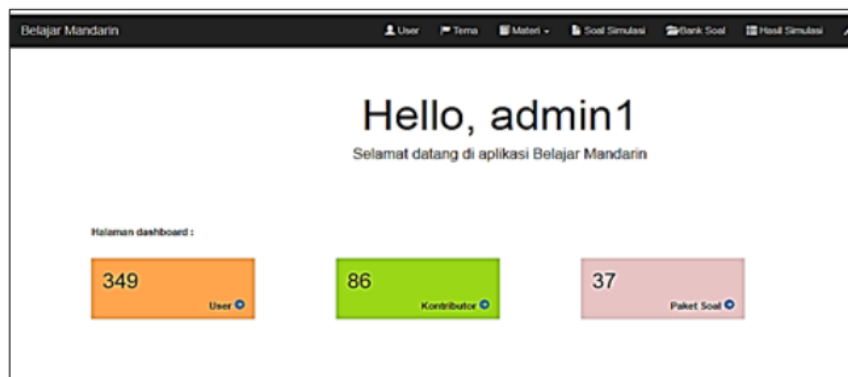


Figure 5 Admin Menu

In Registered users have access in the front-end section to the various content modules for individual study and enrichment in the areas of reading, writing, and listening. This content, which covers reading, listening, and vocabulary, is a requirement for graduation. Candidates who have a large vocabulary will have an easier time selecting a suitable word to fit each phrase since they will have more options available to them. The vocabulary content and how it is used in reading is displayed in Figure 6.



Figure 6 Mandarin vocabulary and reading material

The user can test their ability to test material from each level by utilizing the HSK exam simulation, which is an important use of the application for the user. In addition to the material module, this is an important use of the application. As can be seen in Figure 7, this simulated test includes a feature known as the Timer, which allows users to evaluate how well they comprehend the material.



Figure 7 The simulation process of the artificial HSK exam

Users that contribute to the front-end of the site have the ability to manage HSK exam simulation questions, just like the administrator does in the back-end portion. Figure 8 displays the format of the question bank menu that must be maintained by the contributor or admin. The questions that make up the HSK exam simulation can be created, shown (viewed), updated, or deleted by the Admin as well as any contributor. The questions contained in this question bank can be utilized as a source of material for creating HSK exam simulations at the level of difficulty of your choosing.



Figure 8 Question bank maintenance

The simulation test package can be readjusted (updated) directly through the simulation module by an administrator in accordance with the requirements of the test at each level, as shown in Figure 9. The administration of Mandarin learning themes and the creation of Mandarin subjects are two areas where admin functions and contributor functions differ. Admins are responsible for the former. Contributors are responsible for the latter. In addition to this, the Admin is responsible for managing the users who participate in this program as well as printing reports on the outcomes of user simulations.

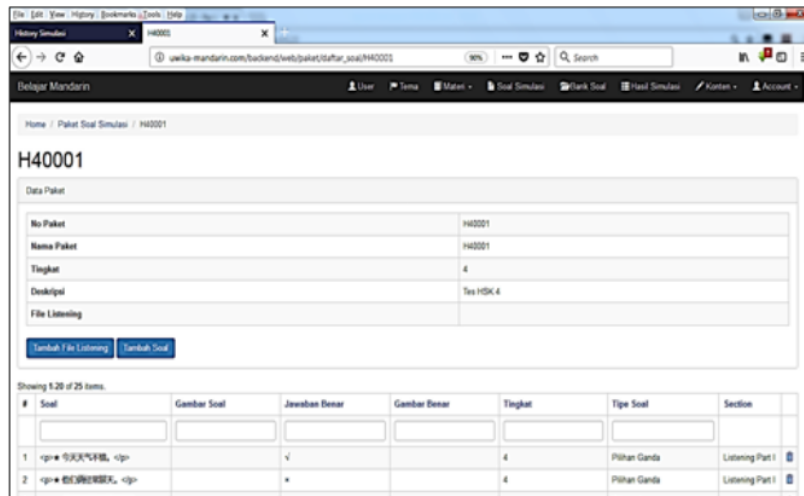


Figure 9 Making dummy HSK exam simulation question

Last but not least, users who have already attempted the exam simulation will be able to access the results of the historical simulation module and print out those findings. The score that you receive based on the outcomes of the simulation indicates the level of knowledge that you have regarding the content of the exam for each level. It will be

possible to improve one's ability to master HSK testing by repeatedly using simulation modules. The report on the simulation outcomes of the Simulated HSK exam may be found in Figure 10 below.

汉语水平考试
Chinese Proficiency Test
HSK (四级) 成绩报告
HSK (Level 4) Examination Score Report

姓名 (Name): _____ 性别 (Gender): 女 国籍 (Nationality): 印度尼西亚
身份证号 (Examination Date): 2019-01-06 08:11 (Monday 08:11:00 AM) 照片

	满分 Full Score	你的分数 Your Score
听力 Listening	100	95
阅读 Reading	100	25
写作 Writing	100	6
总分 Total Score	300	126

Figure 10 The score of HSK exam simulation results

4.4 Testing and Evaluation

4.4.1 Validation Test

The proper functioning of the display interface, data format, file access, performance, startup, and termination are all good indicators of the reliability of the application's features and capabilities. This application allows for contributions to be processed via the Blackbox technique. Testing is performed by monitoring the outcomes of the execution using test data and directly examining the functions that are being provided by the program. According to the findings of the tests, the function of the application operates as intended or correctly therefore can be considered as valid [15].

4.4.2 Data Sampling and Testing

Users from grades 1, 2, and 3 at the Nurul Jadid Probolinggo High School in East Java, which served as the location for the HSK examinations, provided feedback during the testing process for this program. In addition, those who participated in the HSK exam simulations were questioned about the operation and performance of the application and asked for their input. Through the use of several questionnaire formats, the participants were questioned about their perspectives on the nature of the application's content and how it was used. Before the respondents were asked for their input, they were requested to fill out data on their demographics as well as their experience with the HSK exam. The demographic and descriptive information of the participants are outlined in Table 2, which provides an overview.

According to the user profiles, the responses of female users are not significantly different from those of male users. Regarding the HSK test, the vast majority of participants had taken it (83%), however most of them had only done it once (71%). They have only been learning HSK curriculum for an average of one year, but the graduation percentage is high enough for them to attain level 2 (47%). In the table, it appears that the mastery or memorization of the vocabulary for the range 301 - 600, as a standard for school graduation (HSK level 4) looks low at 21% because grade 3 participants who took the trial 15 (21%). This is because the table was created using data from the HSK level 4 test. While still engaging in mock HSK exam simulations, it is intended that these students will have an easier time satisfying the standards set forth by the school for taking the HSK exam. Some students have even achieved a passing score of 2% or above on both the HSK 4 and the HSK 5 exams, which are prerequisites for graduation. Around 80% of people are confident in their ability to successfully pass the HSK exams that are required by schools beginning with HSK level 2 and continuing through HSK level 4. In addition to the demographic profile data, users were questioned about the app's ability to assist in HSK exam preparation and asked for their opinions on how helpful they found the program to be. If you were to rate these 10 aspects of this statement on a scale from 1 to 5, what would your overall impression be? On this scale, 1 indicates that you strongly disagree, and 5 indicates that you firmly agree. Table 3 displays the results of the responses received from the survey participants.

Table 2 Profile of Respondents to the mock HSK exam application

		Amount	Percentage
Gender	M	32	45
	F	39	55
Class	1	22	31
	2	34	48
	3	15	21
Year of Study	< 1 year	32	55
	1-3 year	39	45
	> 3 year	0	0
Mandarin language Habits	Rare	13	18
	Enough	28	40
	Often	30	42
Have HSK Exam	Yes	59	83
	No	12	17
Frequency of joining HSK	1 time	42	71
	2 time	15	25
	3 time	2	4
Pass HSK Exam (level)	Yes (2)	28	47
	Yes (3)	19	32
	Yes (4)	1	2
	No	11	19
Number of vocabularies mastered	<150	6	9
	151 - 300	25	37
	301 - 600	22	31
	601 - 1200	14	21
	>1200	1	1
Level of confidence in the success of the HSK exam	Less	9	13
	Sure	37	52
	Very sure	25	35

There were essentially no significant differences between male and female users throughout the entire sample when it came to their judgments of how easy it was to use, how well they understood the material, and how well the HSK exam simulation worked. Simply said, the procedure of registering for classes and making changes to one's profile is less difficult for male students than it is for female students. In contrast to the male students, the female participants in the study believe that the utilization of adaptable programs that may be used wherever and whenever is not something that is significant.

It was revealed that there were no significant changes in the participants' perceptions of the functionality of the application across students in grades 1, 2, and 3, when seen from the perspective of the class in which they took part in the trial of the application. However, students in grade 3 believe that this application is easier to grasp and fix the data

error ($z * p 0.1 = 1.72$) when compared to students in grade 2, who believe that this application is less flexible ($z * p 0.1 = 1.77$). When compared to students in grade 2, students in grade 1 report having a higher level of self-assurance over their ability to pass the HSK as a result of their recurrent use of the program ($z * p 0.1 = -1.83$).

Table 3 Statistical differences between male and female users

Statement	Male Mean (SD)	Female Mean (SD)	$z^*(p<0,01)$
Ease of Use in user profile	3.19 (1.03)	2.87 (0.37)	1.46*
The application's features are intuitive and well suited for user interaction.	3.63 (0.98)	3.44 (0.91)	0.84
Access to the available modules in an intuitive and simple manner	3.56 (0.95)	3.51 (0.79)	0.24
The content of the examination is in line with the prerequisites for the HSK certification.	3.75 (0.98)	3.82 (0.91)	-0.31
The exam simulation is designed to help students prepare for the real HSK exam.	3.84 (0.99)	3.72 (0.97)	0.54
The application is simple to operate, straightforward to comprehend, and quick to rectify data problems.	3.50 (1.02)	3.31 (1.10)	0.76
Application that is adaptable and may be utilized whenever and wherever	3.91 (1.09)	3.49 (0.97)	1.69*
Application as a way of discussion and interaction between lecturers and teachers of Mandarin among themselves	3.84 (1.02)	3.72 (0.72)	0.59
The application is able to provide findings of exam simulations that are straightforward to comprehend.	4.00 (1.08)	3.82 (0.79)	0.78
The user's ability to pass the HSK exam and their confidence in their ability to do so both improve with the frequency with which they utilize the program and discuss the exam questions.	4.00 (0.98)	3.97 (0.9)	0.11

5. Conclusion

During the epidemic, students who are studying for the HSK exams have found that alternate forms of media, including as online courses, films, and podcasts, as well as other digital resources, are becoming an increasingly significant resource. Students have access to high-quality educational resources that can be accessed at any time and from any location thanks to the availability of these alternate forms of media. In addition to this, they provide a learning environment that is more adaptable to the specific requirements and time constraints of each student.

One of the primary benefits of alternate forms of media is that they can assist students in maintaining their interest and motivation in their academic work. The ability of videos and online courses to be interactive and interesting can make it simpler for students to maintain their concentration on their studies. Students will always have access to the most recent knowledge because to the fact that digital resources may be updated more frequently than traditional textbooks.

The need for HSK exam simulations applications still needs to be developed both in terms of quantity and quality of the content. Website applications that provide sample tests and facilities through direct HSK exam simulation are relatively very high. While the interest in examinations is increasing from year to year in various countries including Indonesia. Based on this research, a website application has been produced which contains material and simulation of online knock-off HSK exams for each level. The findings in this study have been tested on students in grades 1, 2 and 3 of Nurul Jadid Probolinggo High School, as one of the organizers of the HSK examination in East Java. Based on the trial results and participant feedback, it shows that the functionality of this application is valid and is quite significant as a media to help prepare the HSK test to get a better score. This application is flexible for students or anyone to access spare time while increasing their Mandarin abilities.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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