

Mobile Application for Training of Foreign Students with Gamification Techniques and Speech Recognition Technology

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Abstract:

The purpose of this research is to produce a mobile learning product that uses gamification techniques and valid speech recognition technology as a source of learning and is effective for training the pronunciation of foreign students. This type of research is a development research that uses the Lee & Owens model and is validated by 1 media expert, 1 material expert and 1 gamification learning design expert. The results of this study indicate that this application is valid and can be used for learning, students successfully complete the material, practice questions and reach the specified learning standards.

Keyword: Mobile Application, Gamification, Speech Recognition

INTRODUCTION

The BIPA course and training program at Universitas Islam Darul 'ulum Lamongan intended for foreign students has the aim to master the four aspects of language skills which include listening, reading, speaking and writing skills. These four skills should be mastered well so that in the process of learning Indonesian, the material can be conveyed and run smoothly. In the classroom, BIPA students experienced many obstacles including (1) Students felt that the hours of meeting to learn Indonesian were still lacking; (2) The students' speaking skills are still lacking or not yet skilled in expressing opinions or still embarrassed to speak; (3) students still use a lot of language from their own country, and (4) in terms of writing, students still have difficulty understanding spelling and stringing words into sentences.

The BIPA lecturer has dealt with the problem by asking students to look for reading material and material on the internet using the smartphone they carry. However, this is not optimal because the materials are only in the form of e-books and the sources are not in one place or separated. In addition, the need for verbal communication by BIPA students has not been facilitated by the availability of teaching materials, especially speaking skills. For this reason, solutions are needed to facilitate learning, mastery of the material and understanding of the Indonesian vocabulary. One way to practice the speaking skills of BIPA students is to develop an android mobile application using Speech Recognition technology. Speech Recognition is the process of controlling an application using sound based on the spoken word, this can replace the keyboard

function on a smartphone. Examples of the application of this technology are the technology "OK Google" on Android smartphones and "Siri" on Apple iOS smartphones. Speech recognition technology is very appropriate when applied to BIPA students because this technology invites users to say words and speak so that the application runs. this is good to help BIPA students to be proficient in Indonesian.

LITERATURE REVIEW

Gamification

According to Kapp, Setiana & Hansun Gamification is a process that aims to change the non-game context (eg: marketing) to be more interesting by integrating game elements (game thinking, game design and game mechanics). The use of gamification is very effective in creating activities that are usually boring, unpleasant, or less challenging to be more fun to do (Kapp, 2013; Setiana & Hansun, 2017)

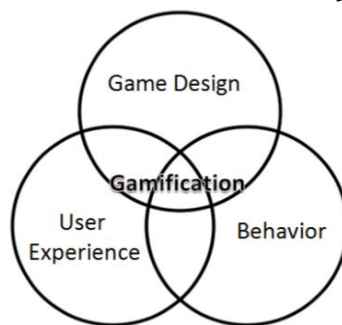


Figure 1. The concept of gamification according to Setiana & Hansun

At first gamification was widely used for world marketing, gamification is now widely applied in the world of education. Gamification learning methods that emphasize learning, with the aim to foster motivation to learn and change student understanding. Research conducted by Sakai & Shiota (2016), Gressick & Langston (2017) and Selirowangi (2018) related to the use of gamification in the classroom to improve learning and learning to produce positive and significant results.

Mobile Applications use Speech Recognition Technology

Speech Recognition is the process of identifying sounds based on the spoken word by converting an acoustic signal, which is captured by an audio device. Speech Recognition is also a system used to recognize word commands from human voices and then translate them into data that is understood by computers. At this time, this system is used to replace the input role of the keyboard and mouse.

The advantage of this system is the speed and ease of use. Words that are captured and recognized can be the final result, for an application such as command & control, data input, and document preparation. The parameter being compared is the level of sound suppression which will then be matched with the available database templates. While the speech recognition system based on the person speaking is called speaker

recognition. Research related to application development that utilizes speech recognition shows valid results and can be used well by users (Dewanta, Isnanto, & Martono, 2015; Ericksoon & Kuswardayan, 2016; Rahmantara, Wardhani, & Saf, 2018).

METHOD

The development model used uses the model proposed by Lee & Owens. The reason for choosing this model is because this model is a model that is devoted to developing learning media (mobile learning) to be applied on a small scale or still in the form of a prototype that will be continuously evaluated and improved (Lee & Owens, 2004).

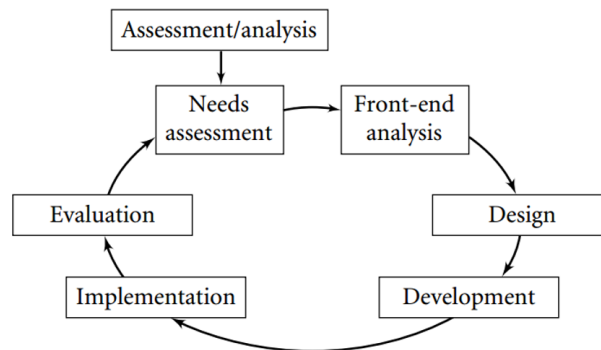


Figure 2. Lee & Owens development model (Lee & Owens, 2004)

Mobile application development steps:

1. Analyze the needs of BIPA students by conducting interviews with BIPA students and BIPA Lecturers.
2. Design the storyboard display of the mobile application.
3. Develop a prototype of a mobile application by adding gamification techniques and speech recognition technology.
4. After the prototype development is complete, it is continued with trials to media experts, material experts, gamification experts and small group and field trials to BIPA students.



Figure 3. Prototype of Mobile Application

The trial development of this mobile application involves testing of media experts, material experts and gamification learning design experts, each of which is carried out by 1 person who is competent in his field. While the small group trial was conducted on 3 BIPA students at Darul Islamic University 'ulum Lamongan and field trials were conducted by 18 BIPA students at Universitas Islam Darul 'ulum Lamongan.

The assessment questionnaire uses a scale of 1-5 numbers with the provision that a value of 1 means that it is not very good/very inappropriate or very inappropriate, value 2 means that it is not good/not quite right/not appropriate, value 3 means good enough/quite right/quite appropriate, a 4 value is good/right/appropriate, and a value of 5 means very good/very appropriate/very appropriate. To process the percentage data from experts and instructors in expert tests and field trials, the following formula is used to find the feasibility of teaching materials.

$$P = \frac{\sum X}{\sum X_i} \times 100\%$$

Explanation:

P = percentage

$\sum X$ = total respondents in an item

$\sum X_i$ = total ideal answer in an item

100 = constant

After a percentage is collected from the overall data processing, it is included in the product eligibility criteria which were also adapted from (Arikunto, 2009). Explanation of product eligibility criteria is explained in the following table.

Table 1. Product Eligibility Criteria

Percentage	Qualification	Follow-up
85%-100%	Very Decent	Implementation
75%-84%	Worthy	Implementation
56%-74%	Decent enough	Revision
<55%	Inadequate	Revision

RESULTS AND DISCUSSION

Results

Based on trials that have been carried out to one media expert, one material expert, one design expert on gamifikasi defense and field trials, the following data are obtained:

Table 2. Table of Results of Media Expert Validation

No	Description	Value
Aspects of the appearance of the application		
1	Display Login and Registration Pages	4
2	Display Help Page	5
3	Display Main Page Page	4

No	Description	Value
4	Profile Page Views	4
5	Material Page Views	4
6	Practical Page Views	4
7	Multiplayer Page Views	4
8	Color Selection, Type and Font Size	5
9	Layout of buttons, images, icons and other visual elements	5
10	The use of language that is easy to understand, good, correct and effective	5
Aspects of Application Functions		
11	Icons and buttons function properly	5
12	The application loading process is fast	4
13	Ease of operation of the application	5
14	Applications can run on all types of android	5
15	The application does not hang or crash when running	4
16	Speech recognition function can work well	5
17	Multiplayer function (online) can work well	5
18	Login and register functions work well	5
19	Application size	4
20	Clarity of use instructions	5

Table 3. Table of Results of Material Expert Validation

No	Description	Value
Application Display Aspects		
1	Color Selection, Type and Font Size	5
2	Layout of buttons, images, icons and other visual elements	5
3	Attractive and proportional application display	4
4	Ease of operation of the application	5
5	Clarity of the functions of each button	4
Material Substance Aspects		
6	The truth of the contents of the material presented	5
7	The use of language that is easy to understand, good, correct and effective	4
8	The appearance of material rashes	5
9	Depth and accuracy of the material	4
10	The material is structured to help students practice pronunciation	5
Learning Aspects of BIPA		
11	Application supports BIPA learning	4
12	Able to support the independence of learning of BIPA students	4
13	Application is made according to BIPA teaching materials	5
14	The application can be used as a learning media for BIPA students	5
15	The application is able to motivate and attract the attention of BIPA students	4

Table 4. Table of Results of Expert Validation Design Gamification Learning

No	Description	Value
Aspects of Application Functions		
1	Icons and buttons function properly	5
2	The application loading process is fast	5
3	Ease of operation of the application	5
4	Applications can run on all types of android	5
5	The application does not hang or crash when running	5
6	Speech recognition function can work well	5
7	Multiplayer function (online) can work well	5
8	Login and register functions work well	5
9	Application size	5
10	Clarity of use instructions	5
Gamification Aspects		
11	Gamification design is in accordance with BIPA learning (pronunciation)	5
12	The gamification goals are clear	4
13	Gamification rules are clear	5
14	Gamification challenge is clear	5
15	Prize (reward / achievement) gamification is clear	4
16	Gamification feedback is appropriate	5
17	Learning progress (progress player) gamification is appropriate	5
18	Gamification leaderboard is appropriate	5
19	Game level (level) gamification is appropriate	5
20	Social engagement (multiplayer) gamification is appropriate	5
Learning Aspects		
21	This application fits the learning objectives	5
22	This application helps student learning	5
23	According to student needs	5
24	Able to motivate and attract the attention of students	4
25	Able to support the independence of student learning	5

Table 5. Results Trials

Sample	Item Value									
	1	2	3	4	5	6	7	8	9	10
X1	5	5	4	5	5	5	5	3	5	5
X2	5	4	5	3	5	5	5	4	4	5
X3	4	4	4	4	5	4	5	4	4	4
X4	5	4	4	4	4	5	4	4	4	4
X5	4	4	4	5	5	4	4	4	4	4
X6	5	4	4	4	4	4	4	4	4	4
X7	4	4	5	4	4	4	4	4	4	4
X8	5	4	4	4	4	4	3	4	4	4
X9	4	4	4	4	4	5	4	4	4	3
X10	5	4	3	3	4	5	3	5	4	2
X11	4	4	5	3	4	4	5	1	3	5
X12	4	5	4	3	3	4	3	4	4	3

	Item Value									
Sample	1	2	3	4	5	6	7	8	9	10
X13	3	4	3	3	4	4	4	4	4	4
X14	4	4	3	4	5	4	4	2	3	4
X15	4	4	3	4	4	4	3	3	4	3
X16	3	3	2	4	4	5	3	4	4	4
X17	2	5	5	4	4	5	4	1	2	3
X18	4	3	2	3	4	4	4	3	3	4

In the trial related to the success of the BIPA student car application was given 3 days to try the Mobile application. The minimum completeness criteria is 70. From the results of monitoring the learning progress of 18 BIPA students in practicing pronunciation. Data obtained as follows.

Table 6. Presentation Table of BIPA Student Pronunciation Practice Progress

User	1st Day	2nd Day	3rd Day
1	9,76	35,56	88,89
2	17,07	75,56	100,00
3	9,76	62,22	80,00
4	9,76	46,67	88,89
5	31,71	57,78	95,56
6	7,32	64,44	73,33
7	31,71	62,22	91,11
8	34,15	64,44	80,00
9	12,20	57,78	82,22
10	36,59	37,78	68,89
11	41,46	44,44	73,33
12	12,20	60,00	75,56
13	29,27	46,67	66,67
14	14,63	73,33	91,11
15	12,20	66,67	88,89
16	12,20	44,44	57,78
17	21,95	66,67	80,00
18	46,34	55,56	100,00

DISCUSSION

Mobile Application is an application that uses gamification techniques and speech recognition technology that aims to train the pronunciation of BIPA students. From the results of the validation of media experts the value obtained 91.00% which has valid criteria and is suitable for use, the results of the validation of the material experts obtained a value of 90.67% which has valid criteria and is suitable for use and the results of the validation of the gamification learning design expert are 97.33%. valid and feasible to use.

From the results of small group trials the value of 78.00% is obtained which has valid criteria and is suitable for use, and the results of field trials are obtained value of 78.67%. has valid criteria and is suitable for use.

From the results of the 3-day learning progress, the following conclusions are obtained:

1. 1st day, the average student progress is 21.68% and there are no students who have passed the minimum completeness criteria.
2. 2nd day, the average student progress was 56.79% and there were 2 students who passed the minimum completeness criteria.
3. On the 3rd day, the average student progress was 82.35% and 15 students passed the minimum completeness criteria.

CONCLUSIONS AND SUGGESTIONS

Conclusions

Utilization of a Mobile application using gamification techniques and speech recognition technology can optimize the process of delivering BIPA student material, especially in word pronunciation.

Mobile applications are one of the learning devices that can support and optimize the learning process. Because the Mobile Application has independent and interactive criteria.

The Mobile Application is declared to be very valid or feasible to be used for BIPA student learning. This is evidenced by the results of statistical calculations namely from media experts obtained a percentage score of 91.00%, material experts at 90.67% and learning design experts as big as 97.33%. From the small group trials obtained a percentage of 78.00%, field trials of 78.67% and student learning progress of 82.35%.

From the results of the validation and learning progress scores, it was concluded that the Mobile application was declared valid and was suitable for practicing BIPA student pronunciation.

Suggestions

Based on responses from media experts, material experts, learning design experts and BIPA students, the following mobile learning products can be revised in the following sections: (1) Some material is too difficult for BIPA students to pronounce so it is better to make the material easier, (2) Developing a version for iOS, (3) Adding images and animations so that they are not monotonous in appearance, and (4) Instructions for use in the English version.

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