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Information System for Game TOEFL like App

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Abstract— **Educative games are trending among students. Games can be used to support student learning. Difficulties in completing a TOEFL (Test of English as a Foreign Language) can be helped by doing game exercises that are similar to the actual test conditions. The TOEFL learning method while playing the game becomes an interesting project, to see how students can use the game experience to master the skills needed for doing a TOEFL. In this study a mobile educative game application is created to understand the TOEFL test that has many features. The *Tommy & Pokina TOEFL-Like App Game* is one game that is expected to be used to improve students' TOEFL abilities. In seeing the results of the students' TOEFL as game players, the integration of games with information systems makes it easy for teachers to get the information quickly. This article shares how the information system help facilitate fast and good data management of the students' TOEFL results.**

Keywords— **Game, TOEFL, TOEFL-like app, information system**

I. INTRODUCTION

Information system is developed because of the large amount of data around us that must be managed properly. Currently, data is popping up everywhere. Consequently, information systems can be implemented everywhere, such as in desktop, laptop, smartphone, tablet, and others to ease data management. Small and medium businesses and industries use information systems to integrate, simplify and optimize work. By utilizing information systems, the activities of a business can be seen and controlled quickly. The growth of information systems on many parts of everyday life every year will always increase because it is an important part of any business.

Games are generally fundamental to socio-cultural dynamics and important for the development of a civilization. This is closely related to the social development of cultures throughout the world where play is a global phenomenon. The game includes a variety of purposes. Real games can be found in digital games that are in accordance with competition, opportunities, and virtual simulation [1].

Most teachers have used computer games in teaching [2]. Students who have used computer games in teaching have a more positive attitude towards the use of educational computer games in the classroom than those who do not use games [3]. Using games in the process of language education is very enjoyable. Games and education combined is usually referred as educative games, can be an entertaining education experience. Students who use the game often get a positive attitude and can be more motivated in doing their course work [4].

Nowadays, features of games usually played in desktops are easily managed in mobile phones. In comparison to the desktop, the mobile phones are more readily accessible and can be carried in anyone's pocket due to its small size and light weight. For this reason, educative games are developed into mobile games.

Mobilegames are application games that are played on wireless mobile devices (mobile phones) for communication. In mobile games, usually, there is a size capacity that is quite small and has a low resolution. Yet, mobile games experience a rapid increase in production because they are supported by devices that are increasingly cheap and have high processing speeds.

The number of internet users in 2017 amounted to 54.68 percent or around 143.26 million of the total population of Indonesia which reached 262 million people. The level of mobile game production is currently so fast. According to the prediction of the Indonesian Creative Economy Agency, the value of the game market in Indonesia has increased very rapidly from year to year. In 2016, the Indonesian game market is estimated to have almost reached the US $ 700 million (around Rp. 9.3 trillion).

Nowadays, many students, who are within the Generation Z and Alphaare using technology so well that they seem to be ageneration that cannot live without technology. Consequently, today's teachers must utilize technology and be more creative in delivering their material. The creative material must have multimedia elements so that students will like whatever teaching material is given to them. One of the implementations of today's digital media is games. In games, there are sounds, moving images, and writing that attracts students to play.

Research has found that language games are proven to yield effectiveness in learning vocabulary in various ways [5]. Not only do language games bring fun to students, language games help them learn and maintain new words more easily. As with any game, a language game would involve friendly competition to keep students interested. In a language classroom, vocabulary games bring real-world context into the classroom and enhances students to use English in a flexible and communicative way. Games are very motivating as they give students new ideas and more opportunities to express their opinions and feelings.

One of the criteria of an English student's mastery in the language is to show how proficient that student is in doing a TOEFL. For this reason, a TOEFL-Like App game has been created by the researchers, who are a team made up from the English Department and Information Systems Department that specifically deals with Game Technology. The researchers see that managing the results of a TOEFL test that goes on for almost an hour, needs to be assisted with some kind of system to ease the burden of the English teachers. Henceforth, the TOEFL-Like Game App is built with an information system to help teachers access the final results online. The result that based itself on a server with a website platform becomes the innovative solution from the researchers. The website can be accessed through the internet

technology that uses the information in all languages easily. The same website link available can be accessed easily using a smartphone, which is readily carried by any student as well as any teacher

One of the most current English language test for the TOEFL is the Integrated-based TOEFL (IBT). This type of test has listening, reading, writing and speaking exercises that are integrated through a certain topic or theme. The component in IBT, which has a Speaking test is interesting to be the purpose of creating an educative game because it is believed that students can finally use English actively in conversation and not just trying to answer questions passively from multiple choice questions. This is in accordance with Tania Horak and Diane Wall, who believe that "students will learn to communicate orally - not to learn skills simply to do well on a test"[6]. This article shares the researchers' innovation of the Tommy & Pokina TOEFL-Like App Game, which is designed by adopting the IBT model, in order that students can not only practice their English passively but also actively through the writing and speaking activity, which follows after the listening and reading exercises.

When students do a Paper-Based TOEFL (PBT) the usual exercise given in a TOEFL test is the Listening, Structure and Reading section. Sometimes though not always is a test in the Writing section. In the IBT, the Writing and Speaking test is compulsory. With the availability of media technology within a mobile app, which allows a user see a video, the researchers innovate the TOEFL by making the Listening test with a digital animation. Following the animation would be questions that test how well the players have heard and seen the details of the animated movie. The other innovation for the TOEFL is the compulsory of doing the Writing and Speaking test which could only be done after successfully doing all of the exercises given in the previous Listening and Reading test. The speaking component is an interesting innovation since using English by way of speaking needs to be introduced early [7]. With Tommy & Pokina TOEFL-Like App made for students who are in the Secondary up to Tertiary level of education, the mobile app would help the students to master the English language from a very early age..The mobile application is, thus, timely devised as it will help students to maximize their English language understanding well in a fun way.

II. LITERATURE REVIEW

An Information System is a system that combines people's skills and information technology that makes, collects, processes, stores and distributes useful data. In this case, information technology (IT) includes the hardware, software and telecommunications networks.

Hardware refers to the physical computer equipment, such as computers, tablets, and components such as computer monitors or keyboards. Software refers to a program or series of programs that tells a computer to perform certain tasks. Telecommunication networks refer to a group of two or more computer systems connected together with communication equipments [8].

The integration of trusted information sources that have the most features are appreciated by teachers, who consider the incorporation of systems into learning activities as beingvery useful [9]. This is because, the information system integration utilizes internet technology which is the most important vehicle for globalization. The internet really helps small entrepreneurs to make small businesses independent [10]. Because the businesses are still small, most often they rely on an attractive website, which is designed to not raise questions for those who visit the website, but instead increases the company's popularity.

It cannot be denied that the internet is the backbone of a business [11] because internet technology make all communication processes become faster and easier. As far as communication is concerned there are still some countries that rely on the TOEFL to test English. The TOEFL participants always practice exams before doing the real test [12]. Games can be included as learning objects in learning units based on community/ collaborative learning strategies, and they can interact with the overall execution environment of the units during learning [13]. Thus, the creation of a TOEFL-Like App game is a media that is expected to improve the understanding of the TOEFL which help increase test scores. Taking into consideration that a test preparation is a procedure, which is carried out to increase test scores, by increasing test skills that are measurable, there are several test preparations procedures to do in the creation of the TOEFL-Like App game. They are taking practice tests, maximizing motivation, overcoming test anxiety, increasing alertness, and instructing test content[14]

The TOEFL-like App game was developed using Android-based technology. This was done, with the understanding that the android, which is an open source mobile operating system developed by Android Inc. and financially supported and then purchased by Google; is primarily designed for the comfort of individuals. Androids have touch screen devices available in the form of smartphones and tablets, currently developed under the Android Open Source Project (AOSP). Android is based on the Linux Kernel, and the application is written in Java [15].

Indonesia is listed as a country in Southeast Asia, with the most citizens using Android. The total is 41 million users or a 94% market share. While OS in Indonesia only used 2.8 million users or 6%. Android controls the market because the OS is free so that the technology produced is very cheap.

The integration of games and information systems is used to find out the results of the test faster and more accurately, and also to help in documenting the data to be stored properly and easily accessible. If a teacher only relies on the mobile phone to see the TOEFL score results of students, the teacher will take too much time to go from one mobile phone to another to gather the data. Because of this, the researchers think of integrating the TOEFL-Like Game App with a web-based platform that uses a PHP programming language with a bootstrap framework. The function of having the bootstrap framework is to simplify and accelerate the development of web-based applications. Within the framework there are already templates that are easy to use. The responsiveness of the framework is also easily seen on desktops and the smartphone mobile technology. Consequently, if the mobile phone's screen is too small, the students and teachers can make use of desktops to download a Bluestack software and have the TOEFL-Like Game App played on the desktop.

In addition to the Bootstrap framework, the researchers also choose to use an open source MySQL database to integrate the mobile-based application and web-based

application in saving the game database. In this way, the database that has been saved can be easily processed in any form according to the wishes of the examiner.

III. RESEARCH METHODOLOGY

The research procedure, of creating the nformation system of the TOEFL-Like Game App consist of:

1. Designing the information system data flow diagram of the game
2. Designing the data flow and data delivery
3. Making the game design
4. Having students lay the game
5. Having students save their TOEFL game result, which will enable the results to be sent to the web based platform's file
6. Analyzing and interpreting the TOEFL data to see how well students master the English language
7. Distributing a questionnaire to participants who agree to try out the game
8. Collecting the result as data
9. Analyzing the data to see how effective the game has helped students improve their English
10. Writing a conclusion

In devising the questionnaire, the researchers make use of TAM (Technology Acceptance Model) as a guideline[16]. Questions are made to answer basically the criteria of whether or not students see the game as having:

1. PEOU (perceived ease of use), which is the degree to which a person believes that the use of the particular system would be free of effort.
2. PU (perceived usefulness), which is the degree to which a person believes that using a particular system would enhance job performance.
3. ATU (attitude toward using), which is a summary evaluation of a psychological object captured in such attribute dimensions as good-bad, harmful-beneficial, pleasant-unpleasant, and like-dislike.
BI (behavioral intention), which is the degree to which a person has formulated conscious plans to perform or not perform some specified behavior.

Participants of the game tryout are 40 students who in 2018 is in semester 1. The students come from the Faculty of Information Systems and from the Faculty of Language and Arts who are enrolled in the English Department.

The type of research is qualitative as it makes use of the 15 questions available in the questionnaire data to map out and describe how successful the system and the quality of entertainment the students experience in English language learning.

IV. RESULT

A. Program Flow

Before performing the TOEFL-Like Game the application needs to be set first on the web server by entering the TOEFL-like test period. The testing period is used to classify test results so that data overlap does not occur. Students start the game by doing the exercise through the types of tests given, namely the Listening, Reading, Writing, and Speaking tests. The flow of the program is seen in Figure 1..

As can be seen, the flowchart is used to help make clear a complex process of how a system is begun and ended. In the process it is seen that the administration staff starts by setting the test period.

In the column for the student part, students would start playing the game by doing the Listening, Reading, Writing and Speakig section of the TOEFL. After the game is finished, the game has been systemized for the result of the students' answers to be sent the server. Teachers would make use of the data in the server to see the results, which is already organized in tabulation form to filter out who has passed the TOEFL exercise.
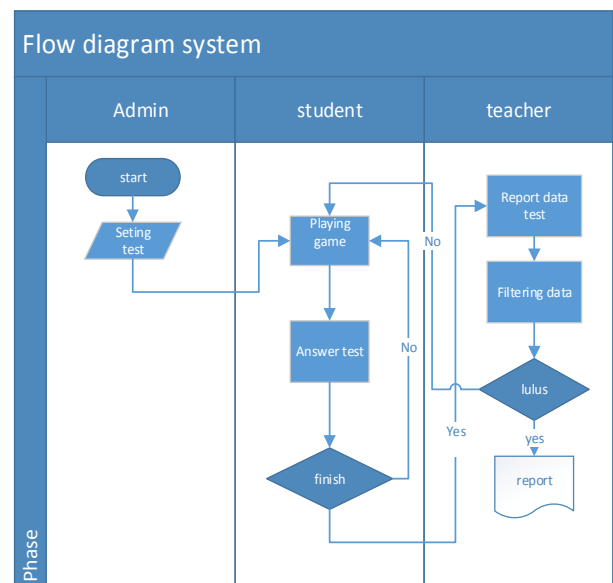

Fig. 1. Flow Diagram

In making the application of the system, the mobile phone application uses the HTTP POST method. In this method, the first step of providing the game on the web is to have the questions and answer keys installed on the mobile application on the TOEFL-Like Game App. With this available, students who have finished playing the game can automatically send data to the server with all of the students' personal information and answers. The method used in sending the data is using a form made available to an HTTP server (POST) with the type IMultipartFormSection.

In functioning the system a UnityWebRequest is created to set the target URL to give out the first string parameter. This also specifies the Content-Type header of the UnityWebRequest, which becomes appropriately used for the data form specified in the lIMultipartFormSection's objects list. A Syntax WebRequest.Post (string url, List <IMultipartFormSection> formSections) follows after. This function attaches the DownloadHandlerBuffer to the UnityWebRequest. The HLAPI function is then used to call on each IMultipartFormSection provided to alternately and format the function into the RFC 2616's multipart standard form.

Finally, the formatted data form is stored in the standard UploadHandlerRaw object, which is then attached to the UnityWebRequest. The IMultipartFormSection object change will only be made after the UnityWebRequest in order that the POST call is not reflected in the data sent to the server.

B. Design of the Game

The TOEFL-like application starts with a multiple choice test in the Listening section by use of viewing a short animated film.. In the animation, the main character is a cartoon in the form of a Pakchoy and Tomato vegetable. The choice of using animated movies as the multimedia for the listening exercise is used, in order that students can remember whatever they have learnt through their sense of sight and hearing. The researchers consider this as an attractive way of having students want to learn the English language because the usual TOEFL listening test would only rely on the hearing ability of the students.

Unlike the real TOEFL, which usually has 50 questions ranging from short statements to longer ones where there is a chance for students to also hear short dialogues and long lectures; the TOEFL-Like Game App only has 5 listening questions with each question done in 30 seconds. In working on the questions, students can look back at the questions that have not been worked on within the time limit duration set in the system. Although students can look back at the questions, they can only try to remember what they heard and saw from the animation.

In the Reading section of the TOEFL-Like Game App, the test questions are located below the reading passage that can be scrolled up and down. The design of the reading questions is shown Figure 2.

Fig. 2. Design Game

As informed, the reading passage can be scrolled up or downwards before the student as a game player decides to choose the right answer to the multiple choice questions given. In this section, there are 10 multiple choice questions that must be completed for 10 minutes in the reading section.
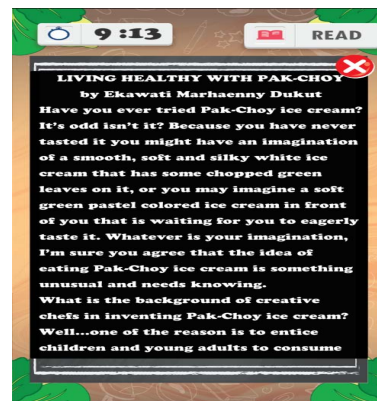

Fig. 3. Reading test design

In the writing exercise, players of the game are given the recipe of the vegetable character implied in the Listening and later developed in the Reading section. Figure 3 below shows a recipe on how to make a tomato pudding. By using 20 minutes of the time, students can reflect on what they have heard and seen through the film animation in the Listening exercise, and also try to remember what kinds of other information has been developed about the vegetable character received from the Reading passage used in the game.
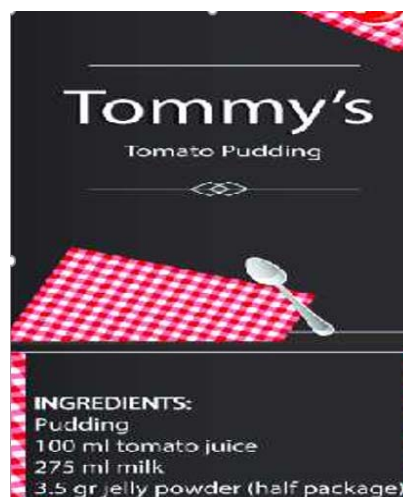

Fig. 4. Writing test design

The knowledge learnt is then used to write up what they can report with regards to the recipe shown. This exercise not only makes students report on how to make a tomato pudding by using the information of the ingredients as data, but it also provides the opportunity for clever students to give their opinion about why the tomato pudding is important for consumption.

In the Speaking test material, users are asked to see a picture of the character of the vegetable cartoon Pokina or Tommy that is arranged in a poster on the left side (see Figure 4). After knowing what to do by reading the instructions, students are asked to record their own voice by pressing the active speaker sign and describe what they are seeing with as many descriptive vocabularies he/ she has.

In this section, students are given 10 minutes to record their voice in their own smartphones. In the game, it is systemized for the recorder to stop automatically after 10 minutes or when the stop button has been pressed.
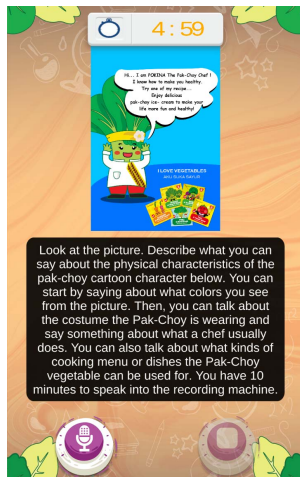
Fig. 5. Design speaking

Recordings will be stored on the smartphone. It is stored in the same folder as the results for storing the answers in the previous three TOEFL sections. Figure 4 shows the design of the Speaking section that makes use of a purple recorder to click on to start the voice recording.Figure 5. Speaking test designOnce the four sections of the test are completed, each student sends the data result to the teacher by use of the web server. The data is quickly sent in real time and eases the burden of a teacher that would manually evaluate the results of the test, Figure 6 below shows the kind of data a teacher would see in the server data's file.

Fig. 6. Information system data design

C. The questionnaire and result

The game serves the purpose of the research, if it can show how effective is the Information System used in playing the game, in addition to how effective the game has in increasing students' English skill.

This article focuses mainly on the system. Out of the 20 questions given, there are 15 questions related to the appearance and ease of use of the game. As shown in table 1, allll of the data is sent securely to the server

No data is lost in the sending process andthe authenticity of the data can be accounted for, because data processing is performed properly. Students as users can submit their report to parties, such as teachers who need it, in aneasy and quick manner.

TABLE I. QUESTIONNARE

No	Question
1	The color display in the game "TOEFL Like App Tommy and Pokina" is interesting.
2	This English game is more fun than just reading a textbook in the classroom.
3	The Tommy and Pokina characters are interesting.
4	Game buttons like "NEXT" and "STOP" are easy to understand.
5	TOEFL and App Android app games like App Tommy & Pokina can run well
6	English used in each TOEFL exercise Like games can be understood easily.
7	The language used in giving instructions for each exercise Listening, Reading, Writing, and Speaking are easy to understand.
8	The time given to play the game is enough to do the problem.
9	The time given to play the game is too much.
10	Learn English using TOEFL game app android Like App Tommy & Pokina more fun.
11	Learning in class traditionally is more fun than using the TOEFL android application game Like the Tommy & Pokina
12	Sounds on short animated films can be heard clearly.
13	The visual image display on the short animation can be seen clearly.
14	English learning media with the TOEFL android application Like the App Tommy & Pokina is the right way to learn without putting aside student play needs.
15	The search for the TOEFL android application game Like the App Tommy & Pokina with the keywords "TOEFL, App, Tommy" or "Pokina" makes it easy to find it so that it can be downloaded from Play Store media technology

In accordance to TAM theory, the 15 questions are designed to show the following:

1. Questions number 1-2, 4, 10, 13-15 are to see how students perceive the easiness and the enjoyment of playing the game due to the mechanics that is regarded simple, understandable and fun to use.

2. Questions number 6, 7 and 14 are to see whether students believe that using the game has enhanced their English language learning.

3. Questions number 3, 8-9, 11-12 shows students' attitude toward using the game. In it is found how students would see it as a good-bad, harmful-beneficial, pleasant-unpleasant, and like-dislike of playing th game.

4. Questions 5 and 14-15 shows to which degree the students would have the intention of playing the game again or promoting it to their friends.

In giving the opinion, students are faced with a Likert scale of choosing answers 1 to 5. The numbers show the following opinion:

1 = strongly disagree

2 = disagree

3 = neutral

4 = agree

5 = strongly disagree

As can be seen in Table 2, if the answer is less than 3 it means that the students are not satisfied enough with the game, and vice versa if the value is more than 3 then the students are showing how much they are enjoying the game.

TABLE II.   RESULTS OF PROCESSING QUESTIONS 1-8 (%)

Question criteria	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)
<=3	24,5	42,1	35,2	50,8	45,6	47,3	43,8	43,8
>3	75,4	57,8	64,7	49,1	54,3	52,6	56,1	56,1

With more than 50% of the students choosing to answer above the value of 3 for questions 1-8 (see table 2), shows that Tommy & Pokina TOEFL-Like Game App has successfully interest students to not only help enhance their English mastery but also as a communicative yet enjoyable game to play with. The answer about how interesting is the colour used (see questionnaire no. 1) tells the researcher if ever this game is developed, the bright yet soft pastel colors should be maintained as it is.

The result of the questionnaire also shows that playing the TOEFL game is much more fun than studying about the TOEFL inside a classroom for more than one hour. The symbols used in the game such as "next, go, stop, record, finish" are simply and effectively constructed.

Meanwhile, questions 9-12 (see Table 3) shows that the time for playing the game is too long, that there is no enthusiasm to learn to use the game model for English learning. This answer makes sense since the material is actually targeted for high school students, meanwhile the testers are university students. Thus, in relation to the answers found in the questionnaire, the university students as respondents have found that the game is easy to do.

Yet, it is interesting to learn that many of the testers' answers to the TOEFL questions do not receive a high score. This may mean that the TOEFL questions are actually difficult and make the students unenthusiastic in playing the game seriously, hence they feel that the time given is too long.

TABLE III.   RESULTS OF PROCESSING QUESTIONS 9-15 (%)

question criteria	9 (%)	10 (%)	11 (%)	12 (%)	13 (%)	14 (%)	15 (%)
<=3	82,4	52,6	61,4	77,1	36,8	42,1	35,7
>=4	17,5	47,3	38,6	22,8	63,1	57,8	64,2

The result of the questionnaire also shows that the visual appearance is very interesting. It becomes one of the good qualities of the game, thus, makes the players want to do the test until the end. This answer is appropriate with some scholars' suggestions that students really just want to play a game and not seriously learn like being in a traditional classroom.

Question 15 is gratifying to find as the main aim of creating the game as way of effectively improve the English language through a TOEFL-Like game is reached. In addition, the condition that the TOEFL-Like Game App is easily found and installed from the Google Playstore is a gratifying answer for the researchers.

V.   CONCLUSION

Through the answers given in the questionnaire, the reaserachers are happy to report that the TOEFL-Like Game App created is generally accepted by users. This acceptance is due to the the ease of operation, good use of comprehensible language, attractive design, ease of installation, and ease of search.

The system information built in for the result of the game to be sent to a web-based data management is found to be supportive. This is because the TOEFL-Like App Game has a system that eases the sending of the data to the server quickly by managing the data and display of the results well.

Although the TOEFL-Like App is easy to use and attractive in its design, answers found from the questionnaire given to students who agree to try out the game feel that the game takes too much time. This length of time has decreased their enthusiasm for playing the game. As a game that is within a serious educative game category, however, sees this finding as a strength. This is because educative games are made with the main intention for learning something valuable while having an entertainment.

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