Anglo-Saxon : Jurnal Ilmiah Program Studi Pendidikan Bahasa Inggris
VOL. 13, No.1 : 43 - 61
Juli 2022
P-ISSN 2301-5292
E-ISSN 2598-9995

DESIGNING *RO-LEX* APPLICATION FOR DYSLEXIC STUDENTS

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Abstract

This research aims at designing learning media named RO-LEX for Dyslexic Students and ease the students in learning English. It focuses only on reading skill. The research method used is Research and Development (R&D) using Borg and Gall model that consists of ten procedures, they are: 1) Research and Information Collecting, 2) Planning, 3) Develop Preliminary Form of Product, 4) Preliminary Field Testing, 5) Main Product Revision, 6) Main Field Testing, 7) Operational Product Revision, 8) Operational Field Testing, 9) Final Product Revision, and 10) Dissemination and Implementation. From the processes conducted, the researcher got the results of the research. 1) The result of material validation is 80 (very good category), 2) The result of media validation is 69 (good category), 3) The result of dyslexic expert was 59 (good category). Based on the results, the researcher concluded that this RO-LEX application is deserved to be used for dyslexic students as an English learning media.

Keywords: *Application, Dyslexic Students, Learning Media, RO-LEX*

INTRODUCTION

In the process of learning, not all students can learn easily. Some students have learning disabilities. Learning disabilities are a group of neurological or brain-based problems that affect one or more ways that a person takes in, stores or uses information. Learning disabilities can affect neuro cognitive processes and may manifest as an imperfect ability to listen, speak, read, spell, write, reason, concentrate, solve mathematical problems, or organize information (Handler & Fierson, 2011). Learning disabilities come in many forms and their effects are different from person to person. They relate to: Getting information into the brain (Input), Making sense of this information (Organization), Storing and retrieving information (Memory), Getting information back out (Output) (INTEGRA, 2009).

Learning disabilities are an umbrella term for a wide variety of learning problems. Learning disabilities are not a problem with intelligence or motivation. Kids with learning disabilities are not lazy or dumb. In fact, most are just as smart as everyone else. Their brains are simply wired differently. This difference affects how they receive and process information. There are some types included in the terms of specific learning difficulties such as dysgraphia, dyslexia and dyscalculia.

Moreover Hammil (as cited in Subini, 2011) stated that learning disabilities are a group of neurological or brain based problems that affect one or more ways that a person takes in, stores or uses information. Then ACCALD (Association Committee for Children and Adult Learning Disabilities) stated that learning disabilities are a condition that the students have difficulty in understanding or in use of spoken or written language. A learning disabilities can cause a person to have trouble learning and using certain skills. The skills most often affected are reading, writing, listening, speaking, reasoning, and doing math or organize information (Handler & Fierson, 2011). More recently, it has been commonly assumed that students with learning disabilities experience significantly more emotional difficulties than do their non learning disabilities classmates (Nelson & Harwood, 2011).

From some definitions above, we can conclude that learning disabilities are a neurological disorder that affects the brain's ability to receive, process, store, and respond to information.

Specifically, the specific learning difficulties that will be discussed in this study are about dyslexia. There are several definitions of dyslexia but probably the most frequently used on is the definition introduced by the International Dyslexia Association (2017) "Dyslexia is specific learning disabilities (SpLD) that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities.'' These difficulties typically are result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension especially reading in foreign language including English.

Discussing about dyslexia, the term comes from two Greek words. They are that means "difficulty with" and lexicos or lexis that means "word". Definition of dyslexia according to International Dyslexia Association, dyslexia is specific learning disabilities (SpLD) that is neurobiological in origin. It is characterized by difficulties with accurate and fluent word recognition and by poor spelling and decoding abilities.

Traditionally, dyslexia has been defined as a discrepancy between reading achievement and intellectual potential as measured by standardized intelligence tests that is as a difference between reading age and mental age (Tunmer & Greaney, 2010).

Dyslexia is a language-based learning disabilities. Dyslexia refers to a cluster of symptoms, which result in people having difficulties with specific language skills, particularly reading. Students with dyslexia usually experience difficulties with other language skills, such as spelling, writing, and pronouncing words. Dyslexia affects individuals throughout their lives; however, its impact can change at different stages in a person's life. It is referred to as learning disabilities because dyslexia can make it very difficult for a student to succeed academically in the typical instructional environment, and in its more severe forms, will qualify a student for special education, special accommodations, and/ or extra support services.

There are many characteristics of dyslexia. In the classroom process teachers can notice among dyslexics such warning signs as: changed or reversed shapes and sequences of letters and numbers, inconsistent and incoherent spelling, skipping words or lines while reading, poor concentration and high distractibility while reading, word blurring, doubling and size change, sounds and meaningful utterances, confusion between left and right, difficulties in judging distances, following directions, remembering instructions, repeating long words and finally illegible handwriting (Mirani & Dewi, n.d.).

Dyslexia is hereditary. According to Read Learning Educational Service (2015) children with a dyslexic parent have a 50% chance of being dyslexic. Individuals with dyslexia often have superior strengths, visual spatial skills, leadership qualities, athletic ability, musical aptitude, empathy, creativity and critical thinking. Dyslexia is estimated to comprise 80% of all reading disabilities and 40% of individuals with dyslexia also have a form of ADD (Attention Deficit Disorder). Children are usually not identified as having reading disabilities until the 3rd or 4th grade. This is past an optimal age for intervention. Children can be tested for dyslexia as early as 5 years of age.

The causes of dyslexia are still not completely clear, but anatomical and brain imagery studies show differences in the brain development and function of dyslexic students. The core

identified problem in dyslexia is a lack of efficiency in linking visual information (letters) to phonological information so that words can be read with relative automaticity. Thus, anything that interferes with this process is a candidate for the cause of dyslexia (Christo, 2015). Dyslexia is not due to either lack of intelligence or desire to learn, with appropriate teaching methods and media, students with dyslexia can learn successfully.

English is one of the most dominating languages of the world which is having its impact on every field of work. English plays a much greater role in the world. English functions are not only as a language of science and technology, but also people use English as a means of communication in economics, politics, social, cultural and trade, multilateral relations, and also for career growth (Ma'arif & Ashlihah, 2017).

In most EFL classes, one of the important goals in mastering English for EFL students is reading. Reading receives a special focus because there are many reasons for this, by acquiring reading they want to be able to read for information and pleasure, for career, and for study purposes. To conclude this, reading is a skill which is highly valued by students and teachers alike (Baroroh, 2018).

Reading is the best way to get knowledge, but for dyslexic students reading is not easy. Therefore the teacher should be able to choose the proper strategy and media. Through observation at SMALB Tunas Harapan I Tembelang Jombang, the researcher found data that teachers mostly use books as learning media in English class. This affect those students bored then they thought that English reading is difficult. They have low motivation in learning English.

In the process of learning there are some factors that affect learning success and one of them is media. The term refers to anything that carries information between a source and a receiver. Generally, media means all tools which may be used by teacher to deliver teaching material to students in teaching learning process to reach certain learning goals. Learning can also be viewed as a process of communication where sender and receiver interchange message and information. In this case media has served as intermediates. According to Heinich, et al. (as cited in Pribadi, 2011) media as a something carrying the message and

information between the sender and the receiver. When the media carries a message or information that contains the purpose of teaching, it is called the learning media.

However according to Gerlach and Ely (as cited in Arsyad, 2009) the media is human, material or event that enables students to get knowledge, skill or attitude. Based on this understanding, a teacher, books and the environment are media. Meanwhile Hamidjojo (as cited in Arsyad, 2009) stated that media as a mediator that is used by human to state the opinion or idea. While Gagne and Briggs (as cited in Arsyad, 2009) stated that learning media is all the tools that are used by the teachers to teach the students. They are books, video recorder, television, pictures, computer etc. The history has indicated that the text, real object, voice and image have long been used as a function in the learning process. The development of a third of technology would provide a significant impact on the process and learning activity.

The media for learning-teaching process provide with the tools to engage learners powerfully in the learning process. It greatly enhances the effectiveness of communication. Media can be used effectively in formal situation where students are working independently or group. Media plays a significant role in the education. It is important to add that the students were quite enthusiastic about finding media to accompany their lessons (Trier, 2006).

Paying attention to all the explanation above and to overcome this problem faced by dyslexic students in learning process, the researcher tried to design the RO-LEX application to help dyslexic student's reading skill. The researcher hopes this media is able to help the students in English class especially in reading activity. This study is conducted at SMALB Tunas Harapan I exactly at Jl. Raya Pesantren No. 246A, Ngrawan Pesantren Tembelang Jombang. The subject of this study is dyslexic students.

The media named RO-LEX. This is a game application that is designed to help the dyslexic students to improve their reading skill. The name of RO-LEX is taken from "Reading for Dyslexia". By using this application the dyslexic students will be more interested to identify the letters, words and sentences. Furthermore, they will get more motivation to keep study hard. RO-LEX Application shows animated image, material, audio, video and colorful

display, so the students will not get bored. This application is made by *Adobe Flash CS3*. RO-LEX Application is also a new innovation that is designed by the researcher.

METHODOLOGY

Research Design

This study used Research and Development (R&D) as a research design. According to Latief (2016) R&D is a research design aimed at developing educational products. There are several steps making up the research, involving the steps of assessing the classroom problems, studying recent theories of educational product development, developing the educational products, validating the products to experts and field testing the products. The researcher adopted Borg and Gall model in conducting this study.

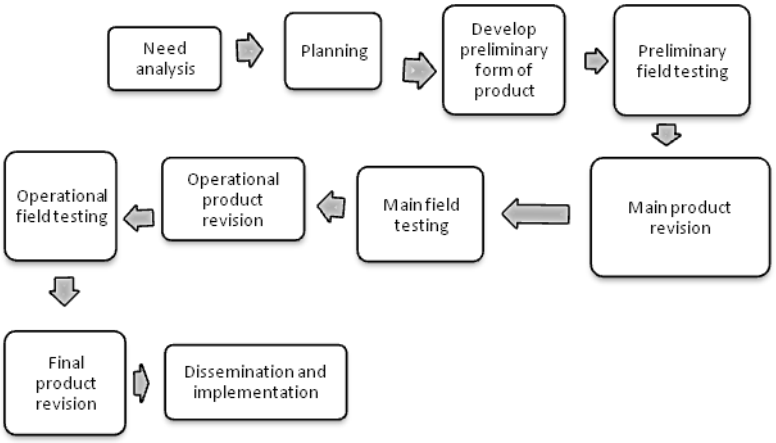

FIGURE 1. DESIGN OF BORG AND GALL'S DEVELOPMENT

The chart explains about the procedure of development in this study based on Borg and Gall development model. This model includes ten steps as the researcher said before, they are (1) need analysis (2) planning (3) develop preliminary form of product (4) preliminary field testing (5)main product revision (6) main field testing (7) operational product revision (8) operational field testing (9) final product revision and (10) dissemination and implementation.

In collecting the data the researcher used observation and interviews. Observation is the technique of collecting data that is not restricted to people but also other natural objects. Sugiyono (2013) pointed out that observation is a complex process, a process composed of various biological and psychological processes. Observation is the best way of supervising the behavior of the research subjects (Ghony & Almanshur, 2016). The researcher observed the activities of dyslexic students in the class especially in learning English.

Interviews were used as data collecting techniques if researcher wanted to undertake a preliminary study to find the problem to take on, and also when the researcher wanted to know the matter of the more intimate responders and the number of responders. Interviews were used by the researcher to know the result of the tryout also. According to Borg and Gall (as cited in Latief, 2016) interview is data gathering instrument that involves direct verbal interaction between individuals. In qualitative research, interviews often take place while one is a participant observer although people in the setting may not realize that the informal conversations they have been engaged in are interviews. According to Sugiyono (2013) Interviews can be either structured or unstructured, and can be done by face to face and by using the phone.

RESULT/FINDING

The first step done in this study is need analysis. This step was done to search information how important the product development is. It consisted of review the literature. A literature review was undertaken to collect research findings and other information.

In this step, the researcher conducted the field study by using observation. Observation was conducted at SMALB Tunas Harapan 1 Tembelang Jombang at December 2021. The researcher concerned to the activities in the English class and what was the problem of students' especially dyslexic students in learning English. In this observation, the researcher used depth interview as instrument. The researcher used unstructured interview to teacher and students. The researcher concluded the result of observation and interviews as follow:

a) The student's reading skill is low, especially for dyslexic students. There were five dyslexic students in SMALB Tunas Harapan 1 Tembelang Jombang.
b) The students had low motivation in learning English. They think that English is difficult.
c) The English teacher rarely used interactive media in teaching English. The English teacher often using text book than media technology. It happened because there were many mentally retarded students than dyslexic students.
d) The students really like to use media technology for learning process. This can be seen when the researcher talked about RO-LEX. They interested to learn English by using RO-LEX. They felt bored when they have to study by using text book only.

Based on the result of interview and observation above, the researcher concluded that some students had difficulties in learning English and needed motivation. They needed an interesting media interactive also.

The next step is product development. Product development is a combination of the stages of planning and development of preliminary form of product. In this stage, the researcher started to develop the media based on the need analysis. The media was made as perfect as possible. Some activities at this stage as follows:

1) The first, researcher prepared the flowchart of RO-LEX. There are two flowcharts. They are flowchart of the first slide and flowchart of the game.
2) Preparing the software is needed. The researcher used Adobe Flash CS3 fitted with support applications such as movie maker, audacity and format factory to edit the audio and video.

a) Adobe Flash CS3

Adobe Flash CS3, previously known as Macromedia Flash, is a software and multimedia platform developed by Adobe Systems, Inc. The program is used for authoring Rich Internet Applications, animation, vector graphics, and games.

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Figure 2. Adobe Flash CS3

b) Movie Maker

Movie maker is a discontinued video editing software by Microsoft. It was a part of windows essentials software suite and offered the ability to create and edit videos as well as to publish them on onedrive, facebook, vimeo, youtube and flickr.

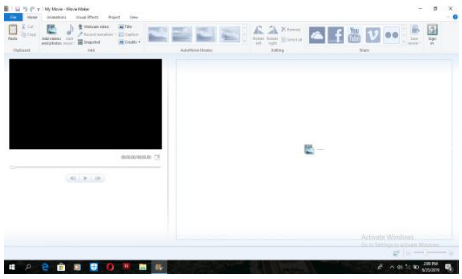


Figure 3. Movie Maker

c) Audacity

Audacity is a free and open source digital audio editor and recording application software, available for windows, macOS/OS X and Unix like operating systems. Audacity can be used to perform a number of audio editing and recording tasks such as making ringtones, mixing stero tracks, transferring tapes and records to computer or CD, splitting recordings into separate tracks and more.

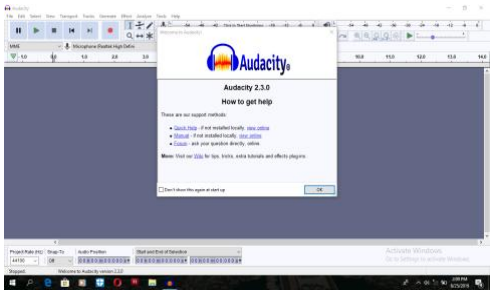


Figure 4. Audacity

d) Format factory

Format factory is an ad supported freeware multimedia converter that can convert video, audio, and picture files. It is also capable of ripping DVDs and CDs to other file formats, as well as creating. The researcher used this application to convert the audio to wav.

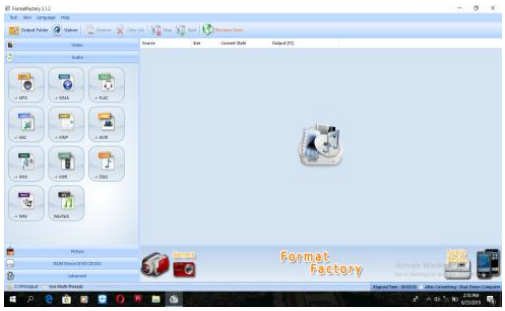


Figure 5. Format Factory

e) The researcher prepared WACOM tablet to draw the pictures. Furthermore, the researcher prepared microphone also for recording.

f) The researcher prepared all materials such as pictures, background, video, background music etc.

g) The researcher made a time schedule to make sure that media finished in the right time.

There are some specifications of this application. The specifications are follows:

Table 1. Specifications of RO-LEX Application

Specification	**Explanation**
OS Platform	Windows XP/above, 32/64 bit
Storage	CD/DVD, Flashdisk, other
removable storage	
Size of Screen	1081 x 608 px
Content	Video (mp4)
Picture (jpg, png)	
Button rollover (btn)	
Audio (wave, mp3)	
Flash Animation	
Text	
Size of Application	54 MB

This game application is designed with two main buttons. They are learning and exercise. Both of them have five parts.

Table 2. The Material of Learning

Button	Material
Level 1	Identify the letters
Level 2	Identify the words
Level 3	Distinguishing the similar letters
Level 4	Reading words
Level 5	Reading story and watching movie

Table 3. The Material of Exercise

Button	Material
Guessing letter	- Students choose the letter based on the questions (listening).
Guessing word	- Students choose the word based on the questions (listening).
Completing	- Students complete the word by dragging one of the answer
CORDING	- The corner of reading (reading story)
CORTING	- The corner of writing (special to give motivation for dyslexic students)

Preliminary Field Testing:

The try out is conducted by the experts (desk evaluation). There are three experts. They are material expert, media expert and dyslexia expert.

Main Product Revision:

This step is done by the researcher after knowing the result of the field testing. The researcher revises the product based on the expert's suggestions.

Main Field Testing:

In this step the researcher starts to try out the RO-LEX application to dyslexic students at SMALB Tunas Harapan I Tembelang Jombang.

Operational Product Revision:

This step is done based on the result of observation and interviews the dyslexic students. There are two students in this try out.

Operational Field Testing:

The researcher completes the revision, then tries out the RO-LEX application to dyslexic students. In this try out, there are three students.

Final Product Revision:

After the revision of this product is done, researcher should evaluate how the product work.

DISCUSSION

In this stage the researcher discusses about the result development based on components of ROLEX.

a. Layout design

Layout design of RO-LEX was very interesting. The background's proportions, lines and colors are combined to make RO-LEX beautiful. RO-LEX was designed by the researcher with various backgrounds. Backgrounds were also suitable for all levels.

b. Text

RO-LEX application used a nice font and clear. The font was on the right size also.

c. Pictures

Pictures on this application supported the material and make sure that students enjoyed to learn English by using RO-LEX. Pictures aimed to make the students more undesrstand about the material. Picture was one of the appropriate media for dyslexic students. The researcher used WACOM tablet to draw the picture. The researcher used internet also to get the beautiful picture.

d. Audio

Audio on this application was located on background music and speaker sounds. Background music aimed to make students fun and enjoy their learning, so they will not bored. However, some students who did not really like or disturbed are able to turn off the background music through the available button, while the speaker sounds aimed to give information about how to read the letters, words or sentences well. The speaker sound was used by the students to get listening questions also.

e. Packaging

RO-LEX application was saved on CD (Compact Disk) with an interesting cover. RO-LEX is able to save on flashdisk, or others too. Moreover, this application was able to save on memory and computer hard disk.

The Procedure How to Use RO-LEX Application

- Put on VCD or Flashdisk to connect in computer or laptop.
- Open the media of RO-LEX.
- Choose one of the links that you like in learning instruction, is better if you learn the material step by step.
- You are able click the sounds that you will hear then practice it.
- Following all of the instructions on RO-LEX.
- You are able click the next procedure if you have done and understood the material.
- Next to the exercise. In this step you will practice and answer the questions.
- You are able to exit the RO-LEX.

Preliminary Field Testing and Main Product Revision

The next step, the validation was done by the expert. There are three experts. They are media expert, material expert and dyslexia expert. The researcher uses validation sheet as the instrument. The researcher used Likert's scale in calculating total score from the validation sheet. Then the quantitative data were changed by the researcher into the qualitative data with the formula as follows:

Table 4. Likert's Scale

Score	Meaning
5	Very good / strongly agree with the statement
4	Good / agree with the statement
3	Fair / not sure with the statement
2	Low/ disagree with the statement
1	Very low/ strongly disagree with the statement

Table 5. Qualitative Data Convert

FORMULA	CATEGORIZATION
X > Xi + 1,8 x sbi	Very Good
Xi + 0,6 x sbi < X ≤ Xi + 1,8 x sbi	Good
Xi - 0,6 x sbi < X ≤ Xi + 1,8 x sbi	Fair
Xi – 1,8 x sbi < X ≤ Xi + 0,6 x sbi	Poor
X ≤ Xi - 1,8 x sbi	Very poor

Description :

- Xi (Ideal Grade) = ½ (Ideal Maximum sore + Ideal Minimum Score)
- Sbi (Ideal Standart Deviation) = 1/6 (Ideal Maximum sore - Ideal Minimum Score)
- X = Empiris Score

Based on the table above we can conclude that if the score shows in categorize very good, so the product does not need revision and the product is feasible to use. If the score shows in categorize good, the revision is optional. Meanwhile if the score shows in categorize fair, the revision is needed. Similarly if the score shows poor or very poor, the researcher must be able to revise the product carefully.

Expert Validation

- Media Validation

This assessment focused on media aspect of RO-LEX application. The expert of this research was the lecturer of Technology Faculty of UNWAHA. Validation sheet or questionnaire was needed to evaluate RO-LEX based on media.

Based on the result of questionnaire sheet, the researcher was able to calculate the total score of the validation sheet. The total score was 67. After we knew the total score, next we calculated the ideal grade (Xi) and ideal standart deviation (Sbi). The result of ideal grade was 51 and ideal standard deviation was 11.3. Then the score was converted to the qualitative data. The score showed that 57,78<67≤71,34 it means that the result of validation sheet or the result of RO-LEX based on media was in **"good"**. Based on the result of media validation, this application needed revision.

- Material Expert

This assessment focused on material aspect of RO-LEX application. The expert of this research was a lecturer of English Education Department of UNWAHA. Validation sheet or questionnaire was needed to evaluate RO-LEX based on material. The researcher was able to calculate the total score of the validation sheet. The total score was 80. After we knew the total score, next we calculated the ideal grade (Xi) and ideal standart deviation (Sbi). The result of ideal grade was 57 and ideal standard deviation was 12,6. Then the score was converted to the qualitative data. The score showed that 80>79,68 it means that the result of validation sheet or the result of RO-LEX based on material is in **"very good"**.

- The Expert of Dyslexia Validation

This assessment focused on dyslexia aspect of RO-LEX application. The expert of this research was a teacher at SMALB Tunas Harapan 1 Tembelang . Validation sheet or questionnaire was needed to evaluate RO-LEX based on dyslexia. The researcher was able to calculate the total score of the validation sheet. The total score was 59. After we knew the total score, next we calculated the ideal grade (Xi) and ideal standart deviation (Sbi). The result of ideal grade was 42 and ideal standart deviation was 9,3. Then the score was converted to the qualitative data. The score showed that 59>58,74 it means that the result of validation sheet or the result of RO-LEX based on dyslexia validation was in **"good"** .

Try Out and Revision

The purpose of the try out is to obtain an initial qualitative evaluation of the RO-LEX application. The field trials consisted of a small group trial in order to determine the feasibility and appropriateness of the use of instructional design. At this stage the researcher visited the subjects then they learned the RO-LEX application. The subjects of this research are dyslexic students at SMALB Tunas Harapan 1 Tembelang Jombang. This subject was determined using observation and interview.

In this phase the researcher interviewed by face to face. The data were gathered through unstructured interview. The researcher interviewed on dyslexic students after they play the RO-LEX application. The researcher asked them to give opinion about RO-LEX application.

Main Field Testing

In this part, the researcher conducted the main field testing in SMALB Tunas Harapan 1 Tembelang, Jombang. There are three dyslexic students. They were chosen by the result of observation, interview and discussions to the teacher.

The researcher conducted the main field testing during two days. The first day, the researcher asked the first dyslexic student to play RO-LEX application. Before he played the RO-LEX, the researcher explained about what is RO-LEX and how to operate RO-LEX. Furthermore, the researcher interviewed him. As the first day, in the second day the researcher asked a dyslexic to play then interviewed him about the media.

Operational Product Revision

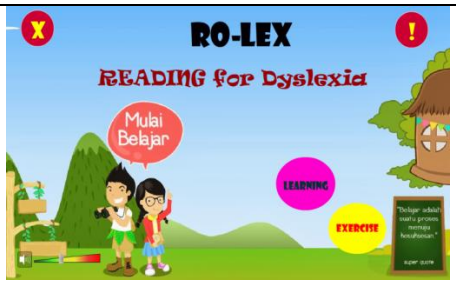
This step is done based on the result of observation and interviews the dyslexic students. There are three students in this try out. Based on the interview with three dyslexic students, both of them suggested that the researcher had to consider background music of RO-LEX application. The researcher used music therapy as the background music of RO-LEX. The researcher assumed that music therapy can help the dyslexic students to more concentrate. Otherwise, they said that music therapy caused them sleepy and bored. After considering their opinion, the researcher decided to change the music therapy. The researcher used the instrument of mama by Jonas Blue as the background music of RO-LEX application.

Operational Field Testing

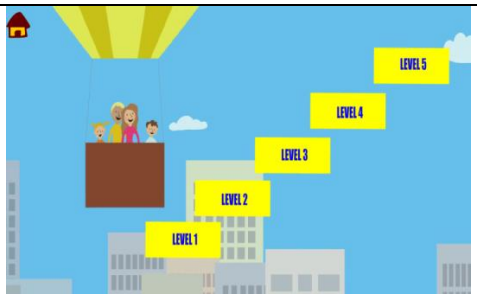
In this part, the researcher asked three dyslexic students to replay RO-LEX. Both of them have played RO-LEX. They played RO-LEX happily. They also did not look like they are having a problem with ROLEX application. Sometime they asked about such as what is CORDING, and then the researcher explained about it.

Final Product Revision

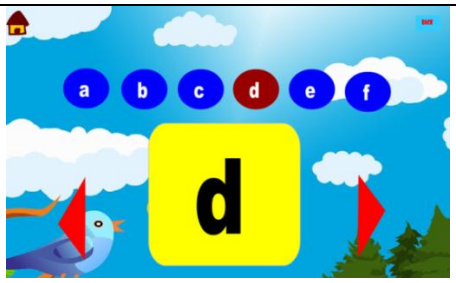
Final product explained the final product after going through several revision stages. After some revisions, RO-LEX application finally became a good media.



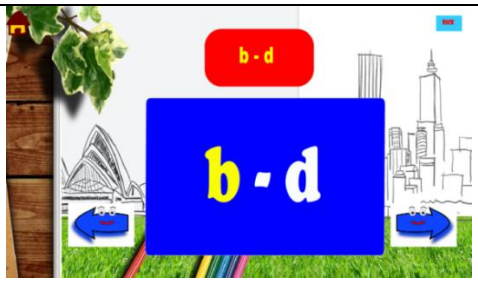
The first slide of RO-LEX application



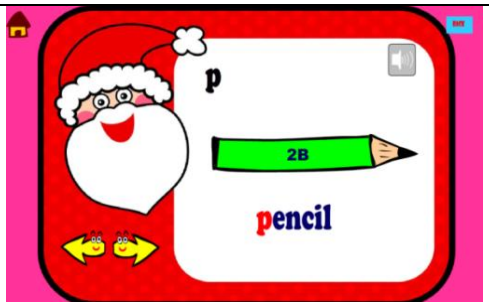
Menu selection in the learning button



Level 1 : Identify the letters one by one

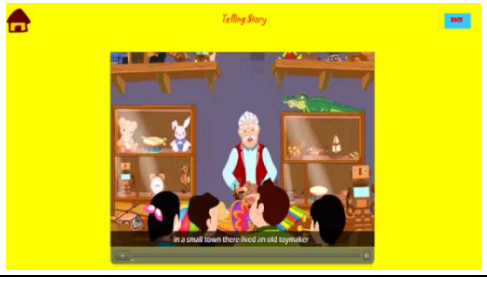


Level 2 : Distinguishing the similar letters

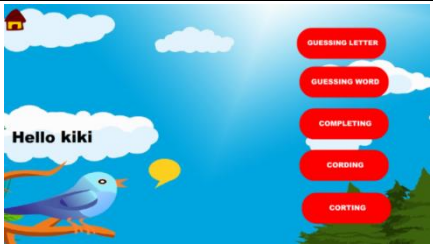


Level 3 : Reading words

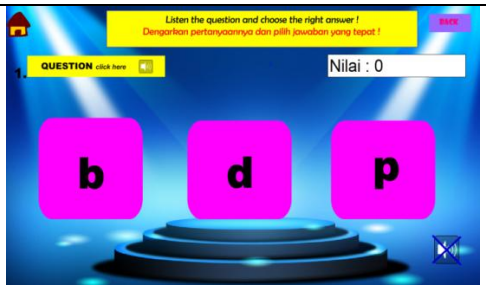
Level 4 : Reading sentence



Level 5 : Reading the story and watching the movie about Pinochio. The students can play the audio button to check whether their pronounciation is true or false .	



The first slide in the exercise button. The students have to write their name and click start button to continue the game.

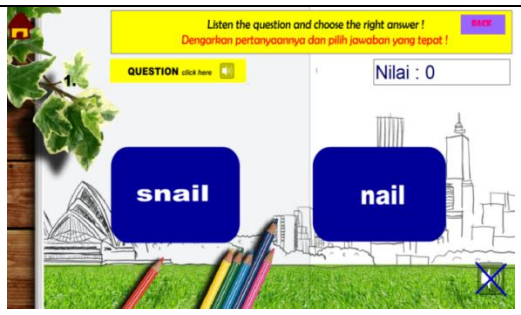


Guessing Letter:

Students choose the letter based on the questions (Listening).

Question = 10

Score = 10 x10 = 100

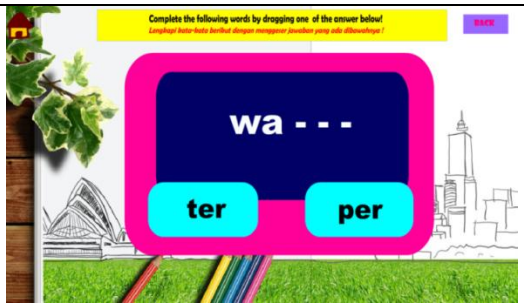


Guessing Word:

Students choose the word based on the questions (Listening)

Question = 10

Score = 10 x10 = 100



Completing :

Students complete the word by dragging one of the answer.
Question = 15

CORDING (The corner of reading)

There are two fable stories, and there are are 5 questions for every story. The students anwer the question in the blank space that provided.

CORTING (The corner of writing)

This part is special to give motivation for dylexic students. There is an inspiration video of Richard Branson, a businessman who success although he has dyslexia. There are many quotes of the popular person such as Jack Ma etc. The students will rewrite the quotes in the blankspace that provided. The students will answer the question about their dream also

About Button :

In this part the researcher explains about the function of RO-LEX application, how to use RO-LEX application and the name of the researcher who designs this application.

CONCLUSION

Based on the results of the research and discussion that has been presented in the previous chapter, it can be concluded that:

Design of RO-LEX application for dyslexic students is good. The researcher concluded based on the score from the experts. The result of media validation is 67 score, other word is good category. The result of material validation is 80, other word is very good category. The result of dyslexia validation is score and 59, other word is very good category.

RO-LEX application can help the dyslexic students in reading. The researcher concluded based on the result of observation and interview. The dyslexic students played RO-LEX happily. They also did not look like they are having a problem with RO-LEX application

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