UNESAJournalofChemicalEducation *ISSN:2252-9454*
Vol.4, No.1, pp.119-125, January 2015

DEVELOPING OF INTERACTIVE E-BOOK MEDIA ON SUBJECT MATTER OF CHEMICALS IN DAILY LIFE FOR HIGH SCHOOL DEAF STUDENT

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Abstrak

Tujuan dari penelitian ini adalah menghasilkan *e-book* yang layak untuk siswa SMALB tunarungu khususnya pada materi pokok bahan kimia di kehidupan sehari-hari. Jenis penelitian ini adalah penelitian pengembangan dengan desain R&D yang dibatasi sampai tahap uji coba terbatas. Instrumen penelitian terdiri atas lembar telaah, lembar validitasi dan lembar angket respon siswa. *E-book* interaktif layak digunakan sebagai media pembelajaran IPA SMALB Tunarungu. Hal ini didasarkan pada tercapainya kriteria kelayakan isi, kebahasaan, dan penyajian. Berdasarkan hasil validasi diperoleh persentase sebesar 92% untuk kriteria isi , 67% untuk kriteria kebahasaan, dan 93,75% untuk kriteria penyajian.. *E-book* interaktif mendapat respon positif siswa sebesar 88%.
Kata kunci : *E-book* interaktif, Bahan kimia di kehidupan sehari-hari, Tunarungu

Abstract

The aim of this research is to describe feasibility of e-book developed for high school of deaf students especially in the matter of chemicals subject in daily life. This research is a research and development which is limited in testing during the development stage. The research instrument consists of the analysis sheets, the validity sheets, and student questionnaire responses. Interactive e-book is feasible for science teaching media in high school, it's based on the validation results, there are 92% for content criteria, 67% for linguistic criteria, and 93.75% for presentation criteria. There are 88% for positive responses from students.
Keywords*: Interactive e-book, chemicals in daily life, Deaf*

INTRODUCTION

Improving the quality of education is one of the government efforts to educate the nation and to develop human resources. Education and teaching are not only given to normal citizens, but also for citizens who have special needs as mentioned in law sikdiknas no. 20 years 2003 in article 5 paragraph 2 which a citizen who has physical abnormalities, emotional, mental, intellectual, and social are entitled to receive special education .

Development of special education curriculum for student who has physical abnormalities, emotional, mental, intellectual is an effort to realize the appropriate education for special needs student, which one of them is deaf children.

Deaf children have hearing disorders, limitations of hearing function

causing deaf children have problems in communicating that will have impacts on cognitive development and intelligence functions [1].

Efforts in improving the cognitive abilities of children with hearing impairment can be done by applying various approaches of communication so that the children will have access to large amounts of language and the opportunity to actively interact with people around them. The application on any kind of method will affect the interpretation and communication of each individual, therefore, total communication method is developed. The application of the total communication method can improve the communication skills of deaf children. The application of the total communication method in the media affects the effectiveness of the learning process and the level of students' understanding concepts [2].

There are studies related to the development of the media show that computer-based media role in improving intelligence deaf students. The use of multimedia and kit as the use of ICT in learning chemistry for deaf students is very effective for students to understand the material of chemical elements [3].

Optimization of hearing impairment children's potential can be done by developing learning media that allows the users to navigate, interact, create, and communicate, such as e-books. E-book is a book in electronic format that allows students to interact with the computer, select the menu that has been provided in the e-book which can be access freely by them. Interactive eBook will train students in writing that the concept has been presented in the material. The results of Langer and Applebee's research concluded that the learning activity that involves writing (such as note, answer questions, and analyze) is better than just reading. This strategy is called writing to learn, writing to learn is useful for deaf students in building students' understanding of science concepts [4]

According to data which obtained from PUSTEKKOM DIKNAS and Journal of Deaf Studies and Deaf Education, has produced some of the e-books for students from elementary, junior high, high school; however, e-books for students with special needs have not been produced. Based on the special education unit SMALB curriculum in science subjects there is some chemistry subject matter, one of which is a chemical in our daily lives. Therefore, the e-book that will be developed to focus on the material of chemicals in everyday life.

The survey was conducted in one of the educational institution; it is Karya Mulia high school, which is addressed in Jl. A Yani 6-8 Surabaya. The school manages the time allocation related to teaching hours of vocational skills rather than cognitive knowledge, for instance, 60% for vocational skills and 40% for cognitive knowledge. The purpose of the school is to prepare learners into working atmosphere; therefore learners can be more focused on the skills that can be used in the real life.

The results of the interview with the headmaster and science teacher were the principal and science teacher in Karya Mulia Surabaya have special needs education as their background interest. The science teacher is not just teaching science subjects but also teaching sports. The science teacher experienced

difficulties in teaching science, especially chemistry. The teacher uses instructional materials and props such as power point in teaching science but the power point that is displayed is not different from the power point for normal children so that students are less able to understand the contents of the power point.

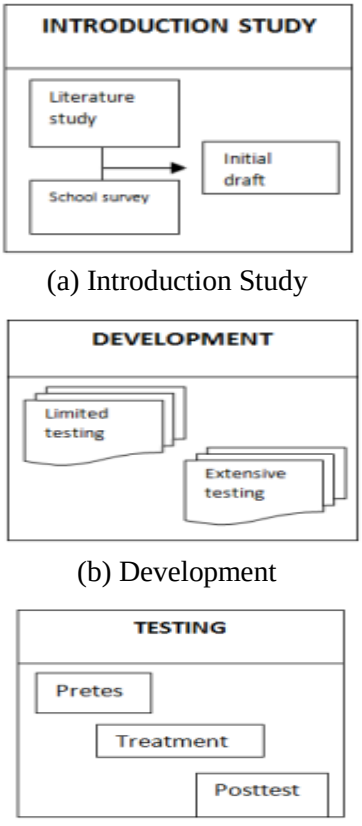
The results of a preliminary research questionnaire in the school explored that all of the five deaf students answered it happily and knew that science materials are chemical materials through their teacher's explanation. There are three students who could not answer the questions because they had difficulties in learning chemistry, mentioning chemical classification. Through questionnaire research, there are five students of student who could operate computer.

Based on this background, it needs to develop feasible e-book. The feasibility is based on accuracy criteria of content, language, and presentation. This research also aims to describe the students' response about *e-book*.

Based on the results of the research, it is expected development of e-book is used as an alternative learning tools for teaching and learning activities in science, especially chemistry lesson for deaf student.

METHODS

This type of research is a development research. The target of this research is an interactive e-book on the subject matter of chemicals in everyday life for high school deaf students; furthermore it will be validated by one lecturer of chemistry, one special need lecturer, and one science teacher to determine feasibility of e-book. The research design used in this research is R&D. The research design can be described as in Figure 1.



(a) Introduction Study

(b) Development

(c) Testing

Figure 1. The design of development research [4].

Design research has three phases, there are preliminary research, development, and testing, but this research is limited to the development phase (limited trial) only. Based on the data from school survey and literatures study, the next stage is designing storyboard of e-book.

Based on the storyboard that have been made, next stage is making contents. The contents of e-book consist

of matter, pictures, videos, sign language videos. First draft of e-book will be analyze by one chemistry lecturer. The aim of this stage is to get some advice based on developed e-book.

The technic that used in data collecting is sheet method and observation method. The research instrument consists of the analysis sheets, the validity sheets, and student questionnaire responses. Validity sheets is given to chemistry lecturer, special need education lecturer, and science teacher in high school of deaf. This instrument aims to collect datas about feasibility of e-book. student questionnaire responses is used to describe student's responses about e-book.

Data were analyzed by descriptive quantitative research. Data were analyzed by using the validation results obtained by calculating a percentage score calculation Likert scale as in Table 1.

Table 1. Likert scale

Assessment	score
Very good	4
Good	3
Less	2
More less	1

To calculate the percentage of eligibility, use the formula as shown in the following equation:

$$percentage(\%) = \frac{sum\ of\ score}{criteria\ score}$$

Score criteria = Highest Score x Total aspects x number of respondents.

The results of the validation sheet analysis is used to determine the feasibility of e-book interpretation of the score as follows in Table 2.

Table 2. Interpretation Likert scale scores

Percentage (%)	Criteria
0-25	More less
26-50	Less
51-75	Good
76-100	Very good

Based on these criteria, interactive e-books on the subject matter of chemicals in everyday life in this research is said to meet the criteria if the percentage is ≥ 51%, or in both categories, so that used in the learning process [5].

Data results of student questionnaire responses were analyzed using percentage calculations obtained by calculation Guttman scale as in Table 3.

Table 3. Guttman scale

Answer	Score
Yes	1
No	0

Analysis of the results of student responses using the percentage formula. The results of student responses analysis are used to describe the response of students after using the e-book. The interpretation of scores as shown in Table 2. Based on these criteria, interactive e-books on the subject matter of chemicals in everyday life in this research received a positive response when the percentage of ≥ 61%, or in both categories [5]

RESULTS AND DISCUSSION

First draft of e-book consist of opening (intro, out cover, in cover, how to use this book, competence, material clasification chart, and introduction), content (material, do you know?, chemist, web chem, keyword, lets remember,

experiment, and worksheet) and closing (evaluation, glosarium, and references).

Result of validation from chemistry professor, special need education lecturer, and science teachers is analyzed by descriptive quantitative. The results of validation is presented in Table 4.

Table 4. Results of Validation of e-books

Criteria	Total	(%)	Category
Language	49	68	Feasible
Presentation	223	84	Very feasible

Based on the Table 4 all aspect are feasible ($\geq$ 51%) to be used as science media in high school of deaf student [5]. Content aspect gets highest persentage as very feasible category. Language aspect gets lowest persentage.

The feasibility of content consists of several indicators that follows in Table 5.

Tabel 5. Percentage of Feasibility Indicator in Content Aspect

No.	Indicator	(%)
1.	Material is presented completely	92
2.	the truth of concepts and definitions	94
3.	The example in material is according with daily life	90
4.	stimulate curiosity	92
5.	e-book can develop their academic, social, and personal (cognitive, affective and psychomotor)	92

The feasibility of language consists of several indicators that follows in Table 6.

Tabel 6. Percentage of Feasibility Indicator in Language Aspect

No.	Indicator	(%)
1.	The language used communicative and interactive	75

Continue of Tabel 6. Percentage of Feasibility Indicator in Language Aspect

No.	Indicator	(%)
2.	sign language easily understood	65
3.	Sign language is based on SIBI (indonesian sign language system)	65
4.	The language used in the text easy to understand	70
5.	Compliance with the language of the limitations and needs of students	66
6.	The sentense is short and clear	63

The language suitability for deaf student s presented as communicative and interactive language. Interactive language can be seen in sign language video.

The feasibility of persentation consists of several indicators that follows in Table 7.

Tabel 7. Percentage of Feasibility Indicator in Persentation Aspect

No.	Indikator	(%)
1.	Cover is interesting	90
2.	The instruction for using the e-book is clear	94
3.	e-book is presented coherently	90
4.	Material in every chapter is given coherently	93
5.	The presentation of images, video, and animation in e-book are interesting	96
6.	Harmony background with display (image, text)	95
7.	The size of the letter corresponding to display e-book	97
8.	The experiment is suitable with material	94,5

Continue of Tabel 7. Percentage of Feasibility Indicator in Persentation Aspect

No.	Indikator	(%)
9.	Compliance testing capabilities provided by the material.	94
10	The gating evaluation is based on basic competence and learning objective	93

Operating of navigation botton in e-book help the student to accesses all features efficiently [8].

Based on the theory of constructivist, the student find and transfer information by themself. Application menu in e-book allows student to bulid knowledge and apply ideas [7].

The results of student responses analysis are based on student responses to interactive e-book. The results of student questionnaire responses follows in Table 8.

Table 8. Student Responses Result

No.	Respondent	The amount of "Yes" answer
1.	Student 1	10
2.	Student 2	7
3.	Student 3	9
4.	Student 4	8
5.	Student 5	10
	Total	44
	Percent	88%
	Response	Positive

Based on the Table 8 interactive e-book gets positive responses from students (≥ 61%) [5]. Positive response can be seen from amount of yes answer in the instrument. Student 1 and 5 have more answer "yes", and the less is student 2.

The result of student responses is focused on the use of language that is not clear. Limitation of langange causes the students have little vocabulary [10].

CLOSING

Conclusion

Based on the results of the data analysis, this research concluded that interactive e-book has been scored by the chemistry lecturer, special need education lecturer, and science teacher are very feasible based on the contents with a percentage of 92%, 67% for language, and 93.75% for percentage of presentation. Interactive e-book has received a positive response from students with percentage of 88%.

Suggestion

Suggestion of this research are:

1. This research is limited in testing during the development stage, so it needs to do further research to know advantages and disadvantages of this e-book.
2. Student has limitation when understanding about the instruction of using e-book, so it needs briefing for first test.

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