

Validity E-Book Based Biology of Materials of the Nervous System Mind Map as an Additional Learning Resource

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Abstract. The purpose of this study is to determine validity e-book nervous system based material mind map as an additional learning resource for class XI MIPA students. The subjects of this study were a team of material experts, learning design experts and design experts layout. The type of research used is development research with the ADDIE model. This development research was carried out to the final stage, namely evaluation. The results of the validation in this study were 88.9 in the very feasible category by the material expert team, 80.9 in the appropriate category by the learning design expert and 97.1 in the very feasible category by the design expert layout. Therefore, e-book material biology based nervous system mind map can be used as an additional learning resource for class XI MIPA students in the subject of the nervous system.

Keywords: E-books, Nervous system, Mind Map, Validity.

1 Introduction

In this era of globalization, the development of information technology is growing rapidly so that many learning resources are in electronic/digital form. In line with the increasing use of smartphones, this has led to a decrease in the use of textbooks. Carrying textbooks, especially in large quantities, is very inefficient. Heavy, relatively large, thick, descriptions on each page are relatively long, easily damaged or weathered and cannot be read in the dark are the negative sides of using textbooks. Therefore, one alternative to overcome the problem of using textbooks is to use e-books [5].

Currently, books that were originally in the form of textbooks have developed into electronic books (e-books). E-book is a text book that is converted into a digital format and can be opened electronically via a computer. E-book is a book publication available in digital form consisting of text, images or even both [3]. At the moment, e-books are much in demand compared to printed books because it is practical and has a search feature so that words in e-

book can be found quickly be found. Excess e-books namely text that is easy to find, economical and environmentally friendly, timeless, easy production and distribution [12].

In addition, the benefits and advantages of using e-books, namely: 1) alternative learning media; 2) load multimedia content; 3) dissemination process e-book easier and faster; 4) not weathered by the environment and 5) easy to process content and keywords to be searched [7]. Making e-books the simplest is to move conventional books into electronic books (e-books).

Based on the results of the development needs analysis e-books material biology based nervous system mind map, it was found that there was no additional teaching material available in electronic form and students did not understand the nervous system material using only textbooks. Books are one type of printed teaching materials. Generally, at the educational level, textbooks are used as the main teaching material [10]. Biology material selected in the development of electronic book-based mind map is the material of the nervous system. In material on the nervous system there are many pictures that must be presented clearly, colorfully and completely. Most students only memorize coordination material so they experience difficulties in learning. This material not only requires an appropriate learning model but also requires a teaching material to support concept mastery and development of soft skill students [4].

The book to be developed is e-books nervous system based material mind map to help students better understand and easily memorize concepts. Draft mind map has long been used in the learning process. Mind map is one of the easiest ways to put information into the brain and take information out of the brain which is a creative and effective way of note taking. All mind maps have something in common, from the use of colors, a natural structure originating from a single point (center), using lines, symbols, words and images which are broken down into a simple series [14]. Excess use of mind maps helps students to see a comprehensive and clear picture, makes it easier to concentrate, attracts attention and makes it easier for students to remember the concept of the nervous system material because there are visual markers. Based on the explanation on, it is necessary to develop an electronic book on biology material based on the nervous system mind map.

2 Method

Types of Research

Development research (*Research and Development*) uses the ADDIE model developed by Reiser and Mollenda with five stages, *Analysis, Design, Development, Implementation and Evaluation*.

Time and Place of Research

The time of this research was carried out in October 2021 - May 2022. The research location for product development was carried out at the Biology Education Postgraduate Program, Medan State University, which is located at Jalan William Iskandar Pasar V Medan Estate Postcode 20221 Medan. Product trials and evaluations were carried out at Madrasah Aliyah Negeri (MAN) 2 Padang Sidempuan whose address is at Jalan Sutan Sori Pada Mulia No.29, Sadabuan, Padang Sidempuan North, Postcode 22711 Padang Sidempuan City.

Data Collection Instruments and Techniques

The instruments used in this study consisted of a feasibility test instrument by the material expert team validator, a feasibility test instrument by the validator by learning design experts and a feasibility test instrument by the validator by design experts *layout*. Qualification testing instruments by validators are used to determine eligibility *e-books* material biology based nervous system *mind map* developed. Each instrument has a different number of aspects according to development needs *e-books* biology. Data collection was carried out using a questionnaire, then analyzed descriptively. Rating score using a scale *Likert* with a score range of 1-4 with criteria not feasible, sufficiently feasible, feasible and very feasible.

Development Research Procedures

This development research procedure consists of five stages, namely *Analysis* (Analysis), *Design* (Planning), *Development* (Development), *Implementation* (Implementation) and *Evaluation* (Evaluation).

Development Design E-books Biology of Matter-Based Nervous Systems Mind map

Design stage done to design the cover, content and *mind map e-books* material biology based nervous system *mind map*. Cover design and content *e-books* using Microsoft Word and plans *mind map* using the app *miMind*. The final results of each design are combined in pdf form, then converted using the application *Anyflip*.

Data Analysis

The final results of validity by the validator will be analyzed using the formula, namely:

$$P = \frac{F}{N} \times 100 \quad (11)$$

Information:

P = Average Score

F = Total Score Acquisition

N = Maximum Total Score

Then, the assessment average score data is converted into modified descriptive quantitative data [1], [2] using the appropriateness test criteria (Table 1).

Table 1. Criteria for e-book due diligence (e-books)

No	Interval score	Category	Decision
1	82 – 100	Very Worth it	The product is ready to be used in the actual field for learning activities
2	63 – 81	Worth it	Products can be continued by adding something less and not too big and doing certain considerations
3	44 – 62	Decent Enough	Revise by carefully re-examining and looking for weaknesses
4	25 – 43	Not feasible	Revise on a large scale and fundamentally about the contents of the product

3 Results and Discussion

Result Validity by Material Expert Team

Validation by material experts was carried out by 2 validators. The assessment by the two experts was carried out to improve the quality of the material on e-books developed biology. The components of the assessment by the material expert team include content feasibility, presentation feasibility and language assessment we can see Figure 1.

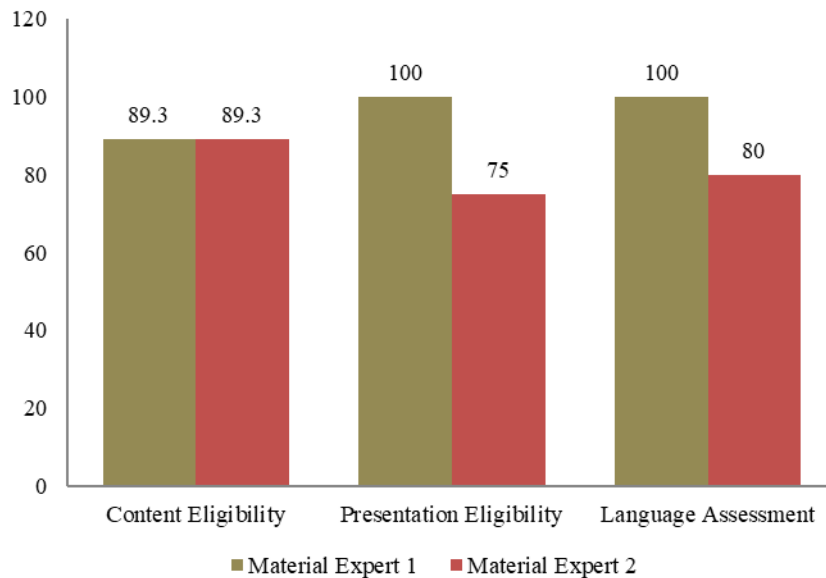


Fig 1. Assessment score by a team of material experts

Based on the figure above, the assessment of validator 1 (material expert 1) obtained an overall average score of the assessment of the product being developed at 96.4 with a very decent category. The highest average score was found in the presentation feasibility and language assessment component of 100. The lowest average score was in the content feasibility component of 89.3. The assessment from validator 2 (material expert 2) obtained an overall average score of the assessment of the product being developed at 81.4 with a feasible category. The highest average score is found in the content feasibility component of 89.3. The lowest average score on the presentation feasibility component is 75.

Overall the average score of the assessment of the two material expert validators regarding the product being developed was 88.9 with a very decent category. The average score of each aspect of the nervous system based material biology electronic book mind map developed ranged from 25 to 100. The highest average score was found in the content feasibility component of 89.3. While the lowest average score is found in the presentation feasibility component of 87.5 (Table 2).

Table 2. The average score of assessment by the material expert team

No	Component assessment	Score	Category	Decision
1.	Content eligibility	89.3	Very worth it	The product is ready to be used in the actual field for learning activities
2.	Eligibility of presentation	87.5	Very worth it	The product is ready to be used in the actual field for learning activities

3.	Language assessment	90	Very worth it	The product is ready to be used in the actual field for learning activities
Average		88.9	Very worth it	The product is ready to be used in the actual field for learning activities

Validity Results by Learning Design Experts

The components of the assessment by learning design experts include the feasibility of the content of the material, the feasibility of presentation, the feasibility of language and mind mapping (Table 3).

Table 3. Average score assessment by learning design experts

No	Assessment component	Score	Category	Decision
1.	Content eligibility	84.1	Very worth it	The product is ready to be used in the actual field for learning activities
2.	Eligibility of presentation	78.5	Worth it	Products can be continued by adding something less and not too big and doing certain considerations
3.	Language qualification	75	Worth it	Products can be continued by adding something less and not too big and doing certain considerations
4.	<i>Mind mapping</i>	86.1	Very worth it	The product is ready to be used in the actual field for learning activities
Average		80.9	Worth it	Products can be continued by adding something less and not too big and doing certain considerations

Based on the learning design expert validator's assessment, overall the average score of the learning design validator's assessment of the product being developed was 80.9 in the feasible category. The highest average score is found in the component mind mapping of 86.1 with a very decent category. The lowest average score is found in the language feasibility component of 75 in the appropriate category.

Validity Results by Design Experts Layout

Component assessment by design experts layout includes cover design, content design and design mind map electronic book biology material based nervous system mind map (Table 4).

Table 4. Average score rating by design experts layout

No	Assessment component	Score	Category	Decision
1.	Design layout consists of an electronic book cover design material biology based nervous system <i>mind map</i>	100	Very worth it	The product is ready to be used in the actual field for learning activities
2.	Content design of the biology material based on the nervous system <i>mind map</i>	94.4	Very worth it	The product is ready to be used in the actual field for learning activities

3.	Design <i>mind mapping</i>	96.9	Very worth it	The product is ready to be used in the actual field for learning activities
Average		97.1	Very worth it	The product is ready to be used in the actual field for learning activities

Based on the assessment of the design expert validator layout, overall the average score of the product developed was 97.1 with a very decent category. The highest average score is found in the design component layout of 100. The lowest average score is found in the content design component of 94.4.

Discussion

In the early stages of research, namely stage analysis needs to find a problem, weakness and conditions that drive the development of a product. The problems found were the unavailability of additional teaching materials in electronic form, the teacher only used textbooks which had deficiencies in terms of some unclear and few images and students did not understand the material on the nervous system. A good text book needs to have correct content, use clear language and systematic presentation [8].

Nervous system material is material that is difficult to understand and memorize. To overcome material that is dense and difficult for students to understand, the teacher usually gives the task of making a concept map of the material. Mind map is a critical thinking concept to make it easier for students to understand the material because it goes straight to the subject matter of a learning material [9]. Along with the times, the use of the internet globally has formed a digital communication culture. This culture requires the community, especially students, to access the information needed through smartphones [6]. Therefore, students need electronic books that contain clear and color-based images and mind map nervous system matter.

In the second stage design (design) by designing cover sets, contents and mind map e-books material biology of the nervous system. Cover design and content e-books material biology based nervous system mind use Microsoft Word. Then, changed the format of the cover plan and content e-books into pdf format. Plan mind map using the app miMind Follow the writing procedure mind map which is true according to Tony Buzan. Plan mind map use implementation brainstorming on the spider web model (The Webbed Model) [13]. Final output format mind map designed in pdf format and converted using the application Anyflip.

Furthermore, the preparation of instruments to test the feasibility and use of biology-based electronic books mind maps as an additional learning resource in class XI nervous system material. One of the instruments used is the feasibility test instrument by a team of material expert validators, learning design experts and design experts layout. The results of data analysis from the material expert validator team obtained an average score of 88.9 with a very decent category. This feasibility test was carried out to improve the quality of the material for the developed biology e-book. The assessment component consists of content feasibility, presentation feasibility and language assessment. The material expert validator I obtained a

final average score of 96.4 with a very decent category. The material expert validator II obtained a final average score of 81.4 in the appropriate category.

The results of the feasibility test analysis of learning design obtained a final average score after being revised to 80.9 with a very feasible category. This feasibility test is carried out to obtain a more complete learning tool in the learning process. The assessment components in this due diligence consist of content feasibility, presentation feasibility, language feasibility and mind mapping.

The results of the design feasibility test analysis layout the final average score after being revised was 97.1 with a very decent category. The assessment component in this due diligence consists of design layout consisting of an electronic book cover design material biology based nervous system mind map, the design of the contents of an electronic book based on the material biology of the nervous system mind map and design mind mapping. This feasibility test was conducted to obtain information about the design layout e-books biology until obtained e-books better and more interesting biology.

4 Conclusion

Based on the results of the validity after being revised by the expert validator team, it was obtained at 88.9 with a very feasible category, the product is ready to be used in the actual field for learning activities by a team of material experts. At 80.9 with a feasible category, the product can be continued by adding something that is lacking and not too big and carrying out certain considerations by learning design experts. 97.1 in the very feasible category, the product is ready to be used in the actual field for learning activities by design experts. Thus, it can be concluded that product development e-books, material biology based nervous system mind maps, can be used as an additional learning resource for class XI MIPA students in the subject of the nervous system.

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