

THE VALIDITY OF INTERACTIVE E-BOOK ON MUTATION TOPIC TO IMPROVE STUDENTS UNDERSTANDING FOR GRADE 12

Validitas-E-Book-Interaktif pada Materi Mutasi untuk Meningkatkan Pemahaman Konsep Siswa Kelas 12

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Abstract

The mutation is one of the most challenging topics in Biology for the students since it has abstract concepts. Implementation of interactive learning media, such as interactive e-books, is an option to make mutation topics easier to understand. Unfortunately, the availability of interactive e-books on this topic is still limited. This research aimed to develop an interactive e-book on mutation topics to improve students' understanding, which is valid for content eligibility, book presentation, and language aspects. The interactive e-book was developed using the Hannafin & Peck model with need analysis, design, and development or implementation phases. The implementation phase was not conducted in the current research. In the development phase, three validators, which included media experts, education experts, and biology teachers, assessed the validity of the developed interactive e-book. Then, data analysis was done using quantitative and qualitative descriptive methods. The result showed that the developed interactive e-book validity was categorized as very high (scored a 93%). Thus, the developed interactive e-book on mutation topics to improve students' understanding is valid. This research implicates the availability of interactive e-book media to understand mutation topics easier. However, further study to confirm the appropriateness of this interactive e-book implementation is still needed.

Keywords : Interactive e-book, mutation topic, students understanding, validity

Abstrak

Materi mutasi merupakan subtopik pada pelajaran biologi yang sulit dipelajari karena konsepnya yang abstrak. Penggunaan media interaktif seperti e-book interaktif merupakan salah satu cara yang dapat digunakan agar materi mutasi dapat lebih mudah dipahami oleh siswa. Namun, keberadaan e-book interaktif pada materi ini masih terbatas. Penelitian ini bertujuan untuk mengembangkan e-book interaktif pada materi mutasi untuk meningkatkan pemahaman konsep siswa, yang valid berdasarkan penilaian dari tiga aspek utama yakni kelayakan isi, penyajian, dan bahasa. Penelitian ini menggunakan model pengembangan Hannafin & Peck dengan tiga tahapan utama yakni analisis kebutuhan, desain, dan pengembangan serta implementasi, namun pada penelitian ini tahapan implementasi tidak dilakukan. Validasi e-book interaktif dilakukan oleh tiga validator yang merupakan ahli media, ahli pendidikan, serta guru biologi. Analisis data dilakukan menggunakan metode deskriptif kuantitatif dan kualitatif. Hasil menunjukkan bahwa validitas dari e-book interaktif yang dikembangkan memperoleh kategori sangat tinggi dengan skor 93%. Berdasarkan hasil validasi dapat disimpulkan bahwa e-book interaktif pada materi mutasi untuk meningkatkan pemahaman konsep siswa yang dikembangkan dinyatakan valid. Implikasi dari penelitian ini ialah kesediaan media e-book interaktif yang dapat mempermudah pemahaman materi mutasi. Penelitian lebih lanjut perlu dilakukan untuk mengkonfirmasi kelayakan penggunaan e-book interaktif ini pada penggunaan secara langsung.

Kata kunci : E-book interaktif, materi mutasi, pemahaman siswa, validitas

INTRODUCTION

Mutation is a change that occurs in DNA or RNA (Warmadewi, 2017). It's one of the topics learned by the students in Biology. Because of its abstract concept, 63.33% of students stated that mutation is a difficult topic (Hestari et al., 2016). Hestari et al (2016) also found the majority of the teachers used PowerPoint slides to teach mutation topics, which makes them more difficult to understand. A solution is needed to improve student understanding of mutation topics.

Previous research conducted by Hestari et al (2016) offered a solution to solve that problem by developed a learning media with certain characteristics, which are easy and fun to use, easy to understand, and simple. A media with those criteria is categorized as interactive media. Interactive media are media that can directly interact with the students. The interview of SMAN 3 Surabaya students indicates interactive media can make them enjoy the learning process and makes the topic understandable. Therefore interactive media can be the solution to this problem.

Interactive media are combination between texts, images, animation, and video that can be delivered by any electronic devices (Rachmadtullah et al, 2018). Interactive media can be combined with almost every electronic media such as gaming, websites, blogs, and e-books. The combination between e-books and interactive media by adding video and animation related to daily life has been done by Restiyowati & Sanjaya (2012) and Hidayat et al. (2017).

Interactive e-books are e-books that are integrated with interactive multimedia (Lestari et al, 2018). Compared to conventional e-books, interactive e-books have several advantages, which are: (1) contain text, images, charts, and video, (2) are flexible, (3) oversimplified abstract topics, and (4) attract student attention (Lestari et al, 2018). Alwan (2018) also stated that interactive e-books are more convenient for the students to use. In accordance, Humairoh & Wasis (2015) and Hartiningrum & Susantini (2019) stated interactive e-books can improve the student's understanding of concepts and are also very practical to use.

Based on the problem and the previous research, this research aims to develop and validate an interactive e-book on mutation topics to improve students' understanding.

METHODS

This research was conducted using the Hannafin & Peck design model that consists of three main steps, namely needs analysis, design, and development or implementation. However, in this research, the implementation step was not conducted.

The variable of this research was the validity of the interactive e-book, which obtain from validation. The validity was reviewed from three main aspects, namely content eligibility, book presentation, and language.

The validation phase was conducted by three validators, namely media experts, education experts, and biology teachers. The experts reviewed the interactive e-book using validation form with a rating scale of 1-4.

Then, the data were analyzed with qualitative and quantitative descriptive techniques. The qualitative descriptive technique was to analyze criticism and suggestion data from validators. This data used to revise and develop the developed interactive e-book. The quantitative descriptive technique was to analyze the scoring data of the validation form. To determine the category of the interactive e-book validity, the following formula was used (Rosyidah & Rahayu, 2022).

$$p = \frac{\sum f}{n} \times 100 \%$$

Note:

p = final score

f = acquired score

n = maximum score

The score obtained from the prior formula was interpreted by using the following table (Akbar, 2013)

Table 1. Validity Category

No	Score (%)	Category
1	80.1-100 %	Very High
2	60.1-80 %	High
3	40.1-60 %	Low
4	0-40 %	Not valid

(Modification from Akbar, 2013).

In accordance with Table 1 and Riduwan (2017) The interactive e-book can be define as valid if get score more than 60.1 %

RESULTS AND DISCUSSION

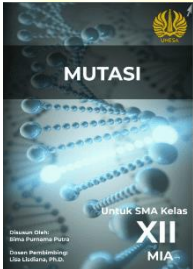
The developed interactive e-book on this research had six section, which were “Pengertian mutasi”, “Jenis-jenis mutasi”, “Penyebab mutasi”, “Dampak mutasi”, “Latihan”, and “Tugas”, which can be accessed using any electronic devices.

In accordance with suggestions from Restiyowati & Sanjaya (2012) and Hidayat et al (2017), several videos and images had been added to this developed interactive e-book. In order to make this interactive e-book attract and motivate students as well as increase the quality of the learning process, several contents such as the table of contents, “Latihan” section, citations, and video designed as an interactive button as suggested by Prasetya et al (2017) and Khairinal et al. (2021).

Interactive E-Book Profile

The display of the interactive e-book and some of its features, presented in the following table.

Table 2. The Display of the Interactive E-Book and its Features

No	Display and Features	Description
1	 	The front and back cover, contained some information about the interactive e-book such as the title, author, institution, and grade.

2



The table of contents, is simply designed and represents each section in the interactive e-book. Students can directly go to the desired section, by clicking the name of the section.

3



Images, some text explanation on this interactive e-book is come up with an related image.

4



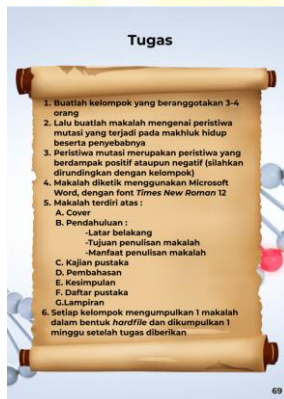
Videos, there are several videos in this interactive e-book. These videos can reinforce the student's understanding the concepts.

5



Exercise and answer, from this section both the students and teachers can assess their understanding about mutation topics.

6



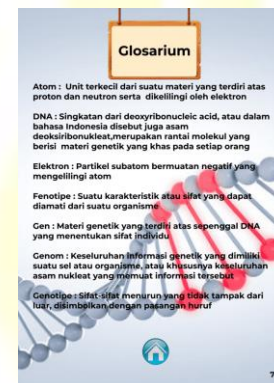
Task, the function of this section is to strengthen the student's knowledge about mutation topics in daily life.

7



References, references that use in this interactive e-book are written in the references section

8



Glossary, contained explanations about some particular words found in the interactive e-book.

Interactive E-Book Validity

The validity of interactive e-book was reviewed and validated from three main aspects which were content eligibility, book presentation, and language. Three validators reviewed and validated the interactive e-book were material experts, education experts, and biology teachers. The result of the interactive e-book validation presented in the following table.

Table 3. Validation Result

Table 37: Validation Result					
No	Criteria	Score			Average (%) / Category
		V.1	V.2	V.3	
Content eligibility					
1	The suitability of the media with the topics	4	4	4	100 % Very high

2	The topics are relevant with the basic competencies (KD)	4	4	4	100 % Very high
3	The topics are relevant with the learning indicators	3	4	4	92 % Very high
4	The topics are relevant with the learning goals	3	4	4	92 % Very high
5	The concept in the media are accurate	4	3	4	92 % Very high
6	Giving new insight	4	4	3	92 % Very high
Average (%)					95 %
Category					Very high
Book Presentation					
1	Display quality	4	3	4	92 % Very high
2	Image quality	3	3	4	83 % Very high
3	Video quality	4	4	4	100 % Very high
4	Layout quality	4	3	4	92 % Very high
5	Flexibility	4	4	4	100 % Very high
6	Oversimplified topic explanation	4	4	4	100 % Very high
Average (%)					94,5 %
Category					Very high
Language					
1	Appropriateness of the language	4	4	3	92 % Very high
2	Grammar	3	3	4	83 % Very high
3	Terminology	4	3	4	92 % Very high
Average (%)					89 %
Category					Very high
Total score from all aspects (%)					93 %

Category	Very high
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Based on the result shown in the prior table, the overall percentage score of the interactive e-book was 93 % with a very high category. Based on Akbar (2013) this score is categorized as a very high validity, indicating that the interactive e-book is valid. In accordance with Wahyuni & Rahayu (2021), a valid interactive e-book can be used for learning process activities.

Overall, the content eligibility aspects were rated 95 % with a very high category. Each of the aspects in these criteria was also rated as a very high category, which indicated the content of this interactive e-book was suitable for teaching mutation topics. Also, in accordance with Basuki on Putra & Fitrihidajati (2022), because of the “giving new insight” aspect has a very high category, this interactive e-book can be categorized as a good book.

The interactive e-book can motivate and attract students, because of its book presentation that have overall score of 94.5% with a very high category. Some images in the interactive e-book had bad quality images, and to increase the quality of the interactive e-book, it must be fixed, in line with Azizah & Budijastuti (2021) that stated the interactive e-book with a good image quality can help the students to learn abstract topics easily. Accordingly, Wulandari et al (2018) stated that the interactive e-book that has a good book presentation can attract and motivate the students.. Based on Table 3, this interactive e-book was flexible and can oversimplified topic explanation. In accordance with Hestari et al. (2016) it means that this interactive e-book is suitable for teaching mutation topics.

The overall language aspects were rated 89% with a very high category, which indicated this interactive e-book was easy to understand (BSNP on Syuryani & Rachmadiarti, 2020, Putra & Fitrihidajati, 2020). There were several grammar mistakes in the interactive e-book, and to prevent the confusion among the readers, it must be revised, in line with Hamim (2020) that stated the grammar must not confuse the readers.

The validators give some suggestions. Details of the suggestions were shown in the following table.

Table 4. Suggestion from Validators

No	Suggestions
1	Several question on exercise section should be changed to facilitated HOTS

No	Suggestions
2	Basic competencies (KD) learning indicators, and learning goals should be more relevant with 2013 curriculum
3	Glossary section was needed

Based on suggestions from the validators, then revisions had been made. The first suggestion was about the exercise, as suggested by validators some exercise has been changed to facilitate HOTS. Based on Kristiyono (2018), HOTS can make the students think more systematically, critically, and creatively. The second suggestion was about the basic competencies, after revising the basic competencies, learning indicators, and learning goals, the interactive e-book has become more relevant to the 2013 curriculum. The last suggestion was to add a glossary, accordingly the glossary section was added at the end of the interactive e-book. As supported by Romadona (2017) adding a glossary to a book can make the readers understand unfamiliar words and can prevent confusion the readers.

CLOSING

Conclusion

Based on the results, it can be concluded that the developed interactive e-book on mutation topics for students in grade 12 is valid, with a 93 % overall score, and thus can be used as learning media on mutation topics.

Suggestion

Futher study is needed to confirm the appropriateness of this interactive e-book implementation.

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