



Development of character education-based e-booklet as learning media on reproductive system material

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Article Information	Abstract
<p>Keyword: Character education; E-booklet; Instructional media; Reproductive system</p> <p>Kata Kunci: Pendidikan karakter; E-booklet; Media pembelajaran; Sistem reproduksi</p> <hr/> <p>History: Received : 29/04/2024 Revised : 25/06/2024 Accepted : 27/06/2024 Published : 29/06/2024</p>	<p>Electronic learning media based on character education, which results in the value of student character education, is still lacking. At the same time, some teenagers today have committed sexual harassment and negative behavior due to low character education. Therefore, it is necessary to have character education-based learning media, especially on reproductive system material. This study determines the validity, practicality, and effectiveness of character education-based e-booklets on reproductive system material. This study aims to produce character education-based e-booklets to determine the validity, practicality, and effectiveness of character education-based e-booklets on reproductive system material for students of class XI Vulpecula SMA Negeri 16 Medan. This research is a research and development (R&D) that uses the 4D model. This research was conducted at SMA Negeri 16 Medan for the academic year 2023/2024. Data were collected using validation sheets, teacher and student response questionnaires, and character education questionnaires for students. Furthermore, the data was collected using a Likert scale. This product was declared valid by media experts (93%), material experts (92%) and character education experts (91%). The results of the practicality analysis showed that the product developed was very practical, with the results for teacher responses (87%) and students' responses (92%). The analysis results of the student character education assessment obtained results (72%) that are developing. The advantages of the biology e-booklet on reproductive system material developed are that it is based on character education, is easy to understand, has an attractive design, and can improve learning outcomes. However, the religious indicators of students have not yet reached the highest criteria. Further research is needed to achieve a broader goal of shaping students' positive character education values.</p> <p><i>Abstrak.</i> Media pembelajaran elektronik berbasis pendidikan karakter yang mengakibatkan nilai pendidikan karakter siswa masih kurang. Bersama dengan beberapa anak remaja zaman sekarang sudah melakukan pelecehan seksual dan tingkah laku negatif yang diakibatkan rendahnya pendidikan karakter. Maka dari itu perlu adanya media pembelajaran berbasis pendidikan karakter terutama pada materi sistem reproduksi. Penelitian ini bertujuan untuk mengetahui validitas, praktikalitas, dan efektivitas e-booklet berbasis pendidikan karakter pada materi sistem reproduksi. Penelitian ini adalah penelitian dan pengembangan (R&D) yang menggunakan model 4D. Penelitian ini dilakukan di SMA Negeri 16 Medan untuk tahun akademik 2023/2024. Data dikumpulkan menggunakan lembar validasi, angket tanggapan guru dan siswa dan angket pendidikan karakter untuk siswa. Selanjutnya data dikumpulkan menggunakan skala likert. Produk ini dinyatakan valid oleh ahli media (93%) ahli materi (92%) dan ahli pendidikan karakter (91%). Hasil analisis kepraktisan menunjukkan bahwa produk yang dikembangkan sangat praktis dengan hasil tanggapan guru (87%) dan siswa (92%). Hasil analisis penilaian pendidikan karakter siswa didapatkan hasil akhir (72%) sudah berkembang. Kelebihan dari e-booklet biologi materi sistem reproduksi yang dikembangkan karena berbasis pendidikan karakter, mudah dipahami, desain menarik, dan mampu meningkatkan hasil belajar. Namun, indikator religiusitas siswa belum mencapai kriteria tertinggi. Penelitian lebih lanjut diperlukan untuk mencapai tujuan yang lebih luas yaitu membentuk nilai pendidikan karakter positif peserta didik.</p>

A. Introduction

Excellent human resources are the most valuable asset for every country. Indonesia has a large population. As a developing country, Indonesia is currently experiencing various problems such as the economic, education, and even the *ahklak* crisis (Prasanti & Fitriani, 2018). During adolescence, individuals search for their identity and experience a potential maturation process (Basuki & Kurnia, 2022). The term character comes from the Greek, *charassein*, which means to engrave. Thus, character shaping is likened to engraving on a stone whose implementation is complex. From this original meaning, the notion of character develops into a unique mark or pattern of behavior. Character education must be implemented at all levels of education, from elementary school to college. In general, character education is needed since early childhood. If a person's character has been formed from an early age, then as an adult it will not change easily despite the many influences that come (Azzet, 2011). The existence of character education from an early age is expected to overcome the fundamental problems in education that have recently become a common concern (Saputro & Soeharto, 2015). The reasons above show that character education is essential planted as early as possible in the education that provides. The most significant contribution to this situation is anticipating problems in an increasingly complex future such as decreasing attention and concern for children towards the surrounding environment, lack of responsibility, and low levels of responsibility self-confidence (Dirgantoro, 2016).

National education according to the National Education System, Law No. 20 (Yusutria & Febriana, 2019) develops abilities and forms human beings with character to improve the nation's intelligence. Character education in Indonesia is in dire need of development. This is considering the increasing number of brawls between students and other forms of juvenile delinquency, especially in big cities, such as extortion, violence (bullying), the tendency of senior domination over juniors, the phenomenon of anarchist supporters, drug use, and others (Setiawan et al., 2021). Even the most alarming desire to develop honesty in children through honesty canteens in several schools, many have failed because they have not awakened an attitude of honesty, discipline, and responsibility (Saputro & Soeharto, 2015). Samani & Hariyanto (2013) explained that in the world of education, cases of cheating, both in the form of cheating on friends' work and cheating from textbooks, seem to be an everyday occurrence. Character education is so essential for the formation of solid character. Strong character will not be formed if the learning process only focuses on activities that emphasize cognitive aspects only. This is following the opinion expressed by Saptono (2011) which

states that character education is critical, character is higher in value than intellectuality. Our lives depend on our character; character makes people able to survive, have the stamina to fight, and overcome misfortune in a meaningful way. An educator must be able to develop exciting learning media to prepare superior human resources in the world of education (Sembiring et al., 2022).

Character development education is the process of developing good habits. It is the process of transforming social behavior into habits and internal consciousness of societal members and turning the requirements for human survival and development into their behavior and captability qualities (Heqiang, 2022). Learning media is very important to be used by educators, because it can be used as an intermediary in delivering material so that it can be easily understood by students and improve student learning outcomes (Wahyuningtyas & Sulasmono, 2020). Learning media can attract and motivate students because it can clarify the presentation of messages and information to facilitate and improve the learning process and results (Dewi et al., 2020). Learning media can help in the learning process so that learning concepts can be conveyed to students properly (Nasir et al., 2018). Learning media can also be used to answer student learning difficulties (Muthy & Pujiastuti, 2020). Education has a vital role in improving and developing human resources' quality. Improved education aims to produce quality human resources and develop the character potential of students to become good human beings have faith and devotion to God Almighty, have noble character, be healthy, knowledgeable, capable, creative, independent and a democratic citizen as well responsible (Derlina & Sriyanti, 2016).

The results of observations regarding material that is difficult for students in grade XI to understand is reproductive system material because it is a reasonably complex material that students must understand. The coverage of reproductive system material discussed tends to be more in the form of reading, with fewer examples showing exciting and colorful pictures. Hence, students are less interested in reading and learning it. According to Elpina et al. (2022), students tend to like interesting reading with few descriptions and many pictures or colors. Pictures can increase reading interest because pictures can help readers imagine. Then based on observations and interviews with teachers related to student character, there is still a lack of discipline such as coming to school late, and not doing the assignments given by the teacher. Then the lack of tolerance among friends such as differentiating social status.

Anwar (2014), in his book argues that directed education is education based on the principles of human nature in education. That is, directed education forms humans as a whole, in terms of

physical dimensions (material) and mental/ immaterial (spiritual, intellect, taste and heart). The statement explains that schools are required to make children intelligent and suitable, because in addition to family and society, schools are also parties that have an essential role in shaping children's character that will make them good citizens and leaders.

Therefore, it is necessary for learning media in the form of character education-based e-booklets to complement and supplement learning media so that students get other information, not only from textbooks and teachers. Through e-booklet, one is facilitated because only by using a smartphone or other device the user obtain information so there is no need to carry a book conveying material in the form of summaries and attractive images, and with this biology e-booklet can be used as a tool to understand the material. Biology is one of the courses that pushes students to develop their conceptual understanding and knowledge construction (Tanjung et al., 2022). Biology can also provide interest and pleasure in learning biology (Hanifah et al., 2020). According to Darlen et al. (2015), e-booklets are learning media that can be used in the learning process in the classroom and outside the classroom. The contents of the e-booklet teaching media include the name of the term, pictures, and some journal literature that can add insight to students, as well as a summary of the explanation so that students can easily understand it. This follows the opinion of Darlen et al. (2015) that the appropriate material included in the e-booklet media is material with many pictures to explain the material concisely.

There have been many development studies related to character education, such as Raqzitya & Agung (2022) who developed character education-based e-modules as a science learning resource, Dewi et al. (2017) who developed character education-based LKPD on bacterial material. Wahyuni et al. (2024) who developed character education-based unique biology digital comic (KUDBI) learning media on virus material, so learning process can be more exciting and material easy to understand. However, few studies have developed character education-based booklet media, especially electronic versions. Thus, this study aims to produce Character Education-based e-booklet learning media on reproductive system material and determine the validity, practicality and effectiveness of the learning media. The results of this study are expected to improve student character education, especially in the learning process.

B. Material and method

Research Design and Research Procedures

Research and development is a research method used to produce specific products and test their effectiveness. This research uses the method developed by Thiagarajan (1974), namely Four-D (4-

D), with four stages: define, design, develop, and disseminate.

1. Define, a. Front-end Analysis: Initial analysis is carried out to discover the fundamental problems in developing e-booklet media. b. Learner Analysis: Student analysis includes characteristics of academic ability and motivation towards the subject. c. Task Analysis: Task analysis aims to identify the main tasks that students will perform, consisting of an analysis of KI & KD related to the material to be developed through the e-booklet media. d. Concept Analysis: Concept analysis aims to determine the material's content in the e-booklet media developed. e. Specifying Instructional Objectives): Learning objectives are analyzed to determine learning achievement indicators based on material analysis and curriculum analysis. 2. Design, a. criterion-test construction b. Media selection c. Format selection d. Initial design 3. Develop, a. Expert appraisal: E-booklet media that has been prepared will then be assessed by material experts and media experts to see whether the e-booklet media is valid for application. b. Development testing: After expert validation, trials are carried out to determine the results of applying e-booklet media in classroom learning. 4. Disseminate.

Instruments and data analysis techniques

This research is composed of the results of verification by material experts, media, and character education experts regarding the feasibility of the developed biology e-booklet media, responses from teachers and students through questionnaires related to the use of biology e-booklet media and questionnaires that assess the character of students, including religious character, discipline, curiosity, social care and tolerance. This investigation instrument is divided into three parts. First, the instrument is used to evaluate the validity of the media, which includes: (1) validation sheet by material experts, (2) media expert sheet, and (3) character education and Qur'anic verse integration expert sheet Second, the instruments were used to assess the practicality of the media, including: (1) a response questionnaire from teachers, and (2) a response questionnaire from students to the use of digital comic media. Third, instruments were used to measure the effectiveness of the media, which involved: (1) character assessment questionnaire of the XI grade students at SMAN 16 Medan.

In this study, the questionnaire used a Likert scale. The Likert scale was used to assess the feasibility of the learning media based on the results of expert verifiers, calculate the percentage, and interpret the responses of the learning media created. The purpose of using this scale is to quickly identify student attitudes that can be categorized as high, medium, or low (Ritonga & Salminawati, 2022).

Various parties, including material, media, and character education experts checked and verified the

validation sheet. This assessment process is a Likert scale and a list of predetermined criteria for each assessment aspect, making it easier to conduct further analysis. Validation data, teacher and learner responses were analyzed using a Likert scale, as in Table 1. The validity was categorized based on Table 2 using Formula 1, and the practicality was categorized based on Table 3. The average learner and teacher responses per aspect score was calculated using Formula 2. The percentage of effectiveness obtained is categorized based on Table 3. If the success rate is $\geq 80\%$ using formula 2, it can be said that the character education-based e-booklet media is effective. The categories of character education development are shown in Table 4.

Table 1 Scoring guidelines on expert validation sheets and response questionnaires

Score	Description
4	Very good
3	Good
2	Quite good
1	Less good

(Source: Ritonga & Salminawati, 2022)

$$\text{Index } 100\% = \frac{\text{Score obtained}}{\text{Maximal score}} \times 100 \dots \dots \dots \text{Formula 1}$$

Table 2 Validity assessment criteria

Percentage	Criteria	Description
0%-44%	Invalid	Total revision
45%-64%	Quite valid	Large revision
65%-84%	Valid	Small revision
85%-100%	Very valid	No revision

(Source: Sinambela & Sinaga, 2020)

Table 3 Practicality assessment criteria

Percentage	Criteria
0%-59%	Impractical
60%-79%	Less practical
80%-89%	Practical
90%-99%	Very practical

(Source: Samitra & Harmoko, 2021)

$$P = \frac{F}{N} \times 100 \dots \dots \dots \text{Formula 2}$$

Description:

P = Percentage of feasibility

F = Value obtained by the research subject

N = Ideal value

Table 4 Percentage category of character education value

Percentage	Criteria
80,1-100	Very developed
60,1-80	Has developed
40,1-60	Developing
20,1-40	Not developing
0,0-20	Very undeveloped

(Source: Arikunto, 2010)

C. Results and discussion

The results of observations and interviews with teachers and students at SMAN 16 Medan are as follows: a) learning in class XI is still using the 2013 curriculum, b) when learning biology, students are more interested in reading comics than books, c) the media utilized by teachers involves the use of LCD projectors along with teaching materials available in printed form and modules, d) the learning process students never use electronic teaching materials based on character education. According to Arikunto (2010), the results of the initial average analysis of the character value of students were classified as moderate at a percentage of 47%. Then carry out KI & KD evaluation. Furthermore, the indicators of reproductive system material for class XI in high school or equivalent level are determined.

The result of media, material, and character education validator and Al-Qur'an integration can be seen in Table 5, 6, and 7. Teacher practicality test results can be seen in Table 8 and student responses in Table 9. Followed by the effectiveness test result in Table 10.

The results of expert validation have revisions for e-booklet content less suitable for use in learning to be improved. In general, the improvements given by the experts so that the e-booklet teaching media is suitable for use include the identity and bibliography of each image, consistent writing of Indonesian words, improvement of writing techniques for terms contained in the e-booklet teaching media, and the addition of material summaries. In Figure 1, there is no improvement from the media expert because, according to the media expert, the cover is quite interesting in the image, font selection, and attractive colors. However, there are several on other pages that must be revised. Table 5 shows the percentage by media validators 93% including the valid category. Arikunto (2010) states that if the feasibility of teaching media obtains a score above 80%, it has valid qualifications and does not need revision, so the e-booklet is suitable for use in learning.

The results of the 92% material validator can be seen from Table 6 that the biology e-booklet is following the material subchapters. The learning material used refers to the competency standards, learning objectives. Based on Figure 1, the e-booklet material already contains explanations and images related to the material discussed. There is also an integration of Al-Qur'an verses related to the material on the page. Good material must follow learning objectives, so students can easily map learning material. Gafur (2012) explains that "the right way to choose learning materials is to pay attention to learning competency standards, as well as learning objectives, besides that textbooks are also the main source in determining the learning materials to be used". The results of the character education expert validator and the integration of the Qur'anic verse

obtained 91% according to Table 7 from the language, grammar and verses related to the material are classified as appropriate even though there are some revisions from the validator. The text in the media uses words, sentences, and statements that are good character education, following the character education indicators achieved. It refers to the characteristics of students so that the writing on the

statement is easy to understand. Regarding the influence of grammar in picture card media to support the feasibility of media in the learning process, Jaya & Suyanto (2016) explain that "a good language variety is language that uses a variety of letters, words, and punctuation, intending to make it easier for readers to understand the purpose and purpose of the sentence or word being read".

Table 5 Validation result by the media validator

Aspect	Score obtained	Maximal score	Percentage	Category
Graphics	22	24	92%	Very valid
Prsentation	41	44	93%	Very valid
Score obtained		63		
Maximum score		68		
Percentage		93%		
Category		Very valid		

Table 6 Validation result by the material validator

Aspect	Score obtained	Maximal score	Percentage	Category
Content of material	46	48	96%	Very valid
Presentation	6	8	75%	Valid
Score obtained		52		
Maximum score		56		
Percentage		92%		
Category		Very valid		

Table 7 Validation result by the character education and integration Al-Qur'an

Aspect	Score obtained	Maximal score	Percentage	Category
Suitability of the verse to the material	19	20	96%	Very valid
Suitability of character education to the material	10	12	83%	Very valid
Score obtained		29		
Maximum score		32		
Percentage		91%		
Category		Very valid		

Table 8 The result response of the biology teacher

Aspect	Score obtained	Maximal score	Percentage	Category
fill	28	36	78%	Practical
Character value	10	12	83%	Very Practical
Graphics	28	28	100%	Very practical
Presentation	35	40	87%	Very practical
Score obtained		101		
Maximum score		116		
Percentage		87%		
Category		Very Practical		

Table 9 The result response of the student

The number of students	Score obtained	Maximal score	Percentage	Category
30 Student	1.435	1.560	92%	Very practical

Table 10 The result of the analysis of the value of character education

Aspect	Initial Score	Final Score	Maximal score	Initial percentage	Final percentage
Discipline	253	330	480	52%	69%
Curiosity	120	220	240	50%	92%
Religious	108	97	120	90%	80%
Social care	134	190	240	56%	79%
Tolerance	143	200	240	60%	83%
Initial score			758		
Final score			1.037		
Maximal score			1.320		
Initial percentage			58%		
Final percentage			72%		
Initial criteria			Developing		
Final criteria			Has developed		

Research conducted by Fauziyah (2017) also shows that the booklet he made booklets for biology subjects are very valid because they meet the requirements. However, in this study the booklet used the electronic version. Then research conducted by Sary & Isnawati (2023) produced similar work in this study based on Edible Mushroom. In this study he made a booklet to increase the entrepreneurial interest of biology students. Furthermore Prananda et al. (2022) made discovery learning-based e-booklets, and their validation results were comparable. These studies show that the development of learning media printed booklets and electronic versions meet the validity requirements on average. This suggests that e-booklets can be used with a variety of educational media and resources.

The e-booklet product that has been validated and revised will then be examined by teachers and students to find answers about the development of the media. The reaction of biology teachers to this biology e-booklet is very positive. As respondents, biology teachers assessed the media as having different aspects such as content, character values, graphics and presentation. The teacher's response can be seen in Table 8, which is very high, reaching 87% with possible criteria. Biology teachers received high scores because the media design was initially developed based on input from media experts, materials, character education experts, and the integration of Al-Qur'anic verses. Then, the biology teacher also said the e-booklet was interesting to learn.

After the verification stage of material, media, and character education experts and the integration of Al-Qur'anic verses is completed, and the teacher's response is clear, the response questionnaire will be distributed to students. It was conducted on 30 students in class XI of SMAN 16 Medan. The results of the responses of 30 students on the media response questionnaire for developing e-booklets with character education content obtained an assessment of 92% can be seen in Table 9, with the criteria of "Very Feasible". This means that the character education-based biology e-booklet made by the

researchers has very feasible criteria for the next stage, namely the effectiveness test.

It is shown in Figure 2 that this e-booklet is based on character values through statements contained in the text column after the material and the integration of Al-Qur'an and hadith verses related to the material and daily life. The positive values in the e-booklet are related to reproductive health and discipline in dressing, and there is a warning that Muslims and non-Muslims must also know the risk of tight clothing because it is one of the causes of sexual harassment out there, which is very detrimental to health, especially in the reproductive system. This gives an excellent influence on getting along and interacting with non-mahrams that can be applied in real life. Five characters in this biology e-booklet can be seen in Table 10 to determine the effectiveness of the e-booklet media according to the results of student responses according to character education indicators.

The religious character development test stems from the initial and final character value questionnaire statements given to students. After students read the e-booklet with characters, there was an increase of 97, which can be seen in Table 10. This follows the character education questionnaire statement that students are amazed at the greatness of God through biological materials, especially on reproductive system material. The disciplinary character gets the final percentage, an increase of 69%, following the character education questionnaire statement that students must pay more attention to protecting the environment and health. Students' curiosity also increased by 92% after reading this character education-based biology e-booklet increased curiosity because there were many new things they had not found in other learning media. Social care and tolerance, with a final percentage of 79% and 83% on this indicator, shows that students want to try to help and advise others regardless of ethnicity and race. Following the value of character education in the e-booklet, not only Muslims are prohibited from having free sex, but non-Muslims too because it greatly affects reproductive health.



Figure 1 Cover and material e-booklet (in Indonesian)



Figure 2 Character education value-based material display (in Indonesian)

Based on the effectiveness test that has been carried out, it is proven that character education-based e-booklet media is effectively applied to the learning process. A series of processes passed from all stages of media development based on the 4D model, which has implications for the effectiveness of the

media, starting from define, design, develop, disseminate as well as trials and improvements that support the success of developing character education-based e-booklet media is quite capable of convincing that this e-booklet media is suitable for use in the learning process.

With the character education-based e-booklet media oriented students can learn quickly because the e-booklet is equipped with images, and text that can attract students' attention. In addition, students are also more participatory in the learning process. For the teacher, the existence of this e-booklet media makes it easier for teachers to implement the learning process in it equipped with instructions for using the media, SK, KD, indicators, and learning objectives, as well as character education values that students must achieve in the learning process related to the material.

Wahyuda (2023) develop comic learning media with character education on virus material at SMA NEGERI 1 Beringin. The results of the analysis of the value of student character education obtained 49% were classified as developing. Hidayanti (2018) the development of character education-based comic book media on class X SMA virus material obtained the results of the value of student character education 46% classified as moderately developed.

These studies support the positive outcomes of developing easy-to-use character education-based learning media. E-character education-based booklets as a form of teaching material that is easy to use and interactive, can overcome students' difficulties in understanding the subject matter and overcome the limitations of learning media variations. So this study shows that students can receive the character education-based e-booklet on reproductive system material during the learning process.

D. Conclusion

Based on the analysis results, it can be said that the character education-based e-booklet is very valid by obtaining a percentage score of 93% from media experts, 92% from material experts, 91% from character education experts and integrating Quranic verses. The results of the practicality test analysis were said to be very practical. Teacher and student responses in this practicality test obtained a teacher response of 97% and a student response of 92%. E-booklet based on character education is said to be effective because the analysis results obtained in the initial tabulation were 58% and the final tabulation was 72%. It can be stated that there is an increase in student character after learning to use e-booklet media. So it can be concluded that the character of students, especially class XI Vulpeculla SMAN 16 Medan, is categorized as developed. The limited variety of learning media and students' challenges to the subject matter can be overcome using character education-based e-booklets as teaching materials.

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