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Developing islamic values-based biology smart cards for the eleventh-grade students of special school

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ABSTRACT

Students with special needs require specific education services different from other students in general. This research aims to develop Islamic value-based biology smart cards media for students with hearing and visual impairments. Furthermore, this research also seeks to determine the feasibility and effectiveness of the developed learning media in improving students' learning motivation. This research employed the research and development method (R & D) with the development procedure proposed by Borg and Gall, which consists of nine stages. The research involved three experts in validating the product: a media expert, a material expert, and a language expert. Ten students with hearing impairment and ten students with visual impairment were selected as the research subjects. The validation findings from media experts are 98.5 percent, material experts' validation results are 97.32 percent, and linguists' validation results are 98.12 percent. The findings of the paired sample t-test were 0.00 < 0.05. As a result of the product trial, it can be determined that the developed Islamic value-based biology smart card media are feasible and effective in enhancing eleventh-grade special school students' motivation with hearing and visual impairments..

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INTRODUCTION

Students with special needs have unique traits and limits that distinguish them from other students, necessitating specialized assistance (Zahroh & Wiraraja, 2017). The students with hearing and visual disabilities are a group of individuals with special needs. Effective special education is entirely dependent on the teacher's potential (Ardianingsih, 2017). Their restrictions provide a significant obstacle for a teacher while teaching subject matter. In this scenario, it appears that the teacher is responsible for designing and conducting the learning process in such a way that learners can attain the established goals (Istiqomah, 2020; Laylatul & Yamtinah, 2017)

Biology is one of the subjects taught in special schools that require more effort to provide students with learning experiences (Burdiarti, Desi Ika, 2020). Biology instruction at SLB (special

school) follows the same instructional model as in public schools, as does the subject matter. In SLB, the learning process is tailored to the students' ability, with teachers using more straightforward materials than in public schools. Given the Special School's background of children with special needs, it is vital to utilize learning aids during the learning process due to their restrictions (Zahroh & Wiraraja, 2017).

The digestive system is one of the biological subjects taught in SMALB (Special Senior High School). It is taught to deaf and visually impaired students in class XI SMALL. The material's fundamental competence is to explore the relationship between the human digestive system's structure, function, and process. One of the topics in biology that students find challenging is the human digestive system. Food is digested by the digestive organs of the human body, which include the mouth, esophagus, stomach, small intestine, large intestine, and anus. It consists of two stages: mechanical digestion and chemical digestion (Aryunia Diah, Choirul Muslim, Syalfinaf Manaf, 2004).

Numerous variables contribute to the difficulty of students with hearing and visual impairments in studying biology. The observations at the Dharma Bhakti Special School in Kemiling, Bandar Lampung city with one of the high school teachers who is deaf indicate that the school does not yet have teaching materials that support the process of learning biology and that learning biology is currently reliant on teacher handbooks, the school environment, and other simple media. The issues made it hard for students to comprehend the subject matter of biology, leaving them bored and unmotivated to learn.

Motivation for learning is critical to the teaching and learning processes in the classroom. For teachers, understanding their students' learning motivations is critical to sustaining and enhancing their learning motivation. Meanwhile, for students, learning motivation can build an attitude toward learning, encouraging them to pursue knowledge (Endang, 2020).

Based on the interview with a biology teacher at SLB-A PRPCN Palembang, the delivery of subject matter has been adapted to children with special needs. Students with visual impairments access material via braille, tangible embossing items, or audio. Students with hearing impairments require visual or audio media. Students are stimulated to express through direct thought about the object they are studying when participating in learning media learning activities (Pujiastuti & Suyitno, 2020). As a result, educational media truly aids the learning process of students with hearing and visual impairments.

Learning media are required to facilitate learning and assist children with impairments while in school (Riza et al., 2018). Teachers must be creative and original to ensure that learning is not repetitive and improve students' willingness to study (Pradina & Hastuti, 2017; Ramadhani Rahmi, 2020). The biology smart card is an appropriate medium for overcoming the learning difficulties of children with special needs.

Smart cards are visual media that generate printed copies of material that carry information about the material (Pasaribu, Rahmi, & Notowinarto, 2019). Smart cards are made to be as attractive as possible, with vividly colored ornaments that stimulate students' interest in learning and make it simpler for them to comprehend and grasp the topic (Aidilsyah, 2017; Roshida, 2016). Technological advancements can assist teachers and students in the learning process (Sri Anggoro, Bidayati Haka, & Hawani, 2019).

The educational problem now is determining how religious lessons may be blended into general studies, so that science's cultural worth is not purely secular (Rostiana & Kartini, 2019). Students do not demonstrate Islamic ideals in their actions, and many consider Islam only during worship; therefore, religious lectures focus exclusively on God's worship (Yunita, Maridi, Pd, Prayitno, & Pd, 2019). Integrating Islamic beliefs into education is critical because it can shape students' character and personalities (Tia Ekawati, Bambang Sri Anggoro, 2019). It is encouraged

in Islamic teachings to incorporate it into our daily actions, one of which is eating and drinking ethics. It is feasible because the number of people who comprehend Islam is still relatively limited, and there are no activities that blend Islamic and general subjects.

According to research conducted by(Muniroh, Umar Handayani Nindya, Parmin, 2016), smart cards can boost students' learning and conceptual understanding. According to research conducted by (Hidanurhayati, Sihaloho, & La Kilo, 2018), smart card media is extremely suitable for usage as a learning medium. Based on prior research and development, this research produces an innovative biology smart card media using the newest technology in the form of an Islamic-based biology smart card.

This biology smart card media includes graphics and explanations for students with hearing impairments as an added benefit. It also contains braille texts and QR codes that link to video explanations for students with visual impairments. This media is appropriate for students with hearing and visual impairments. Additionally, the biology smart card incorporates Islamic principles such as Islamic eating and drinking habits and verses from the Koran and hadith concerning the materials of the human digestive system.

Islamic value-based biology smart card media is projected to support students in receiving and comprehending biology lessons, particularly the digestive system, increasing students' motivation and interest in learning biology, and providing an understanding of Islamic values education. Moreover, teachers are likely to benefit from using the biology smart card learning media when teaching, particularly the digestive system.

Developing Islamic value-based biology smart card media for students with hearing and visual impairments is one of the main goals of this research. Also, this research sought to determine whether developing such media was feasible and, if so, whether or not it effectively increased the motivation of students with hearing and visual impairments.

RESEARCH METHODS

Research Design

In this research, the researchers utilized the research and development method with the development model by Borg and Gall. The research and development method might result in the production of a certain product. It is vital to conduct research based on needs analysis to determine the efficacy of the products developed by researchers before they can be utilized in the larger community. Therefore, research is required to determine the effectiveness of the product (Sugiyono, 2013).

Population and Samples

Students with hearing impairments from SLB Dharma Bhakti Kemiling and visual impairments from SLB-A Bina Insani Bandar Lampung made up the population. The sample comprised ten students with hearing impairments and ten students with visual impairments. The sample was limited to twenty students since, in special schools, the number of students in one class was just ten.

Instruments

The following tools were utilized to collect data: 1) media expert validation sheet 2) material expert validation sheet; 3) language expert validation sheet; 4) questionnaire for student responses 5) initial and post-motivation questionnaire for students.

Procedures

The research and development processes were conducted out using a design adopted from Borg and Gall. The original research procedure consisted of ten stages. However, the researchers

only utilized nine stages. The development research steps were as follows: research and information collecting, planning, developing the preliminary form of product, preliminary field testing, main product revision, main field testing, operational product revision, operational field testing, and final product revision (Borg and Gall, 1983).

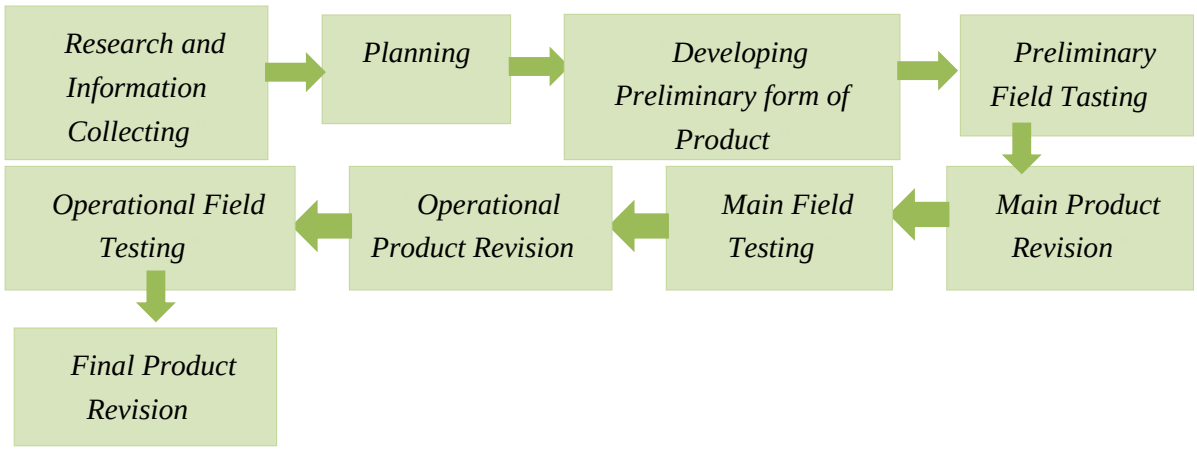


Figure 1. The Development Model by Borg and Gall

Data Analysis

In this research and development, the researchers analyzed the expert validation questionnaires and student response questionnaires. Along with the normality and homogeneity tests, the researchers performed an effectiveness test using the N-Gain formula. This test was used to determine the increase in students' learning motivation toward applying the Islamic value-based biology smart card media based on the initial and final learning motivation questionnaires. The formula for N-Gain is as follows: (Sundayana, 2014).

$$N\ Gain = \frac{\text{Pretest Score} - \text{Posttest Score}}{\text{Max Score} - \text{Pretest Score}}$$

The N-Gain categories can be seen from the results of the posttest and pretest, as can be seen in Table 1.

Table 1. N-Gain Categories

N-Gain Score	Categories
g < 0,7	High
0,3 < g < 0,7	Moderate
g < 0,3	Low

Then, the media feasibility was interpreted based on Table 1 (Arikunto, 2013).

Table 2. Feasibility Categories

Average Score	Categories
<21%	Poorly Feasible
21 – 40%	Not Feasible
41 – 60%	Quite Feasible
61 – 80%	Feasible
81 – 100%	Highly Feasible

Paired sample t-test was used to determine the effect of Islamic value-based biology smart card media on students' learning motivation (Sunarto dan Riduwan, 2010).

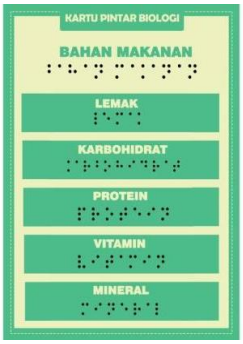
$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} - 2r\left(\frac{s_1}{n_1}\right)\left(\frac{s_2}{n_2}\right)}}$$

RESULTS

The smart cards were designed using Corel Draw X4 software. The smart card also contained QR codes created using the QR Code Generator software. The product contains materials that have been adapted to the core competencies, basic competencies, and indicators. Also, the product contains Islamic values related to digestive system materials, such as Quranic verses and hadith about food and drink and eating and drinking etiquette in Islam. The researchers used the validation results as a reference to improve and perfect the product after being validated by the material, media, and language experts. The results of the product revision can be seen in Table 3.

Table 3. The Comparison Results before and after Product Revision

Validator Notes	Before Revision	After Revision
The back cover of the container box displays several images of the biology smart cards.	 Description: There is no image of the biology smart card on the back cover of the container box.	 Description: There are images of the biology smart cards on the back cover of the container box.
Images and descriptions are added to the card of Islam's eating and drinking etiquette to make it more interesting and easy to understand.	 Description: There is no	 Note: There are images,

	image, and it is difficult to understand.	and it is easy to understand.
The materials contained in the biology smart cards are adapted to core competence (KI) and basic competence (KD). One card consists of one sub-material only.	 Description: There are two sub-materials on one biology smart card.	  Description: One card contains only one sub-material.
Some cards' braille writings are not neatly written (the size, font, and others).	  Description: The braille is not neatly written and is inappropriate.	  Description: The braille is neatly written and appropriate.

The product's feasibility was validated by two media expert lecturers, two material expert lecturers, and two language expert lecturers. The researchers obtained the validation results from the first and the second stages of validation. The data on the comparisons be seen in the following figures 1, 2 and 3.

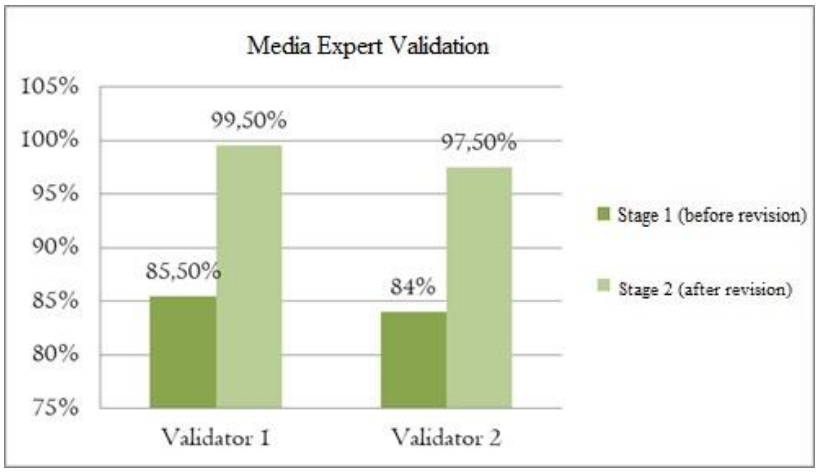


Figure 1. Media Expert validation before and after Revision

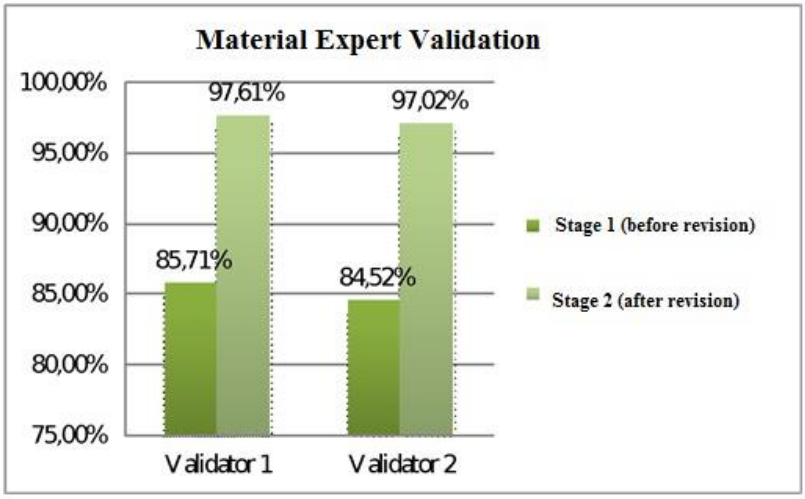


Figure 2. Material Expert Validation before and after Revision

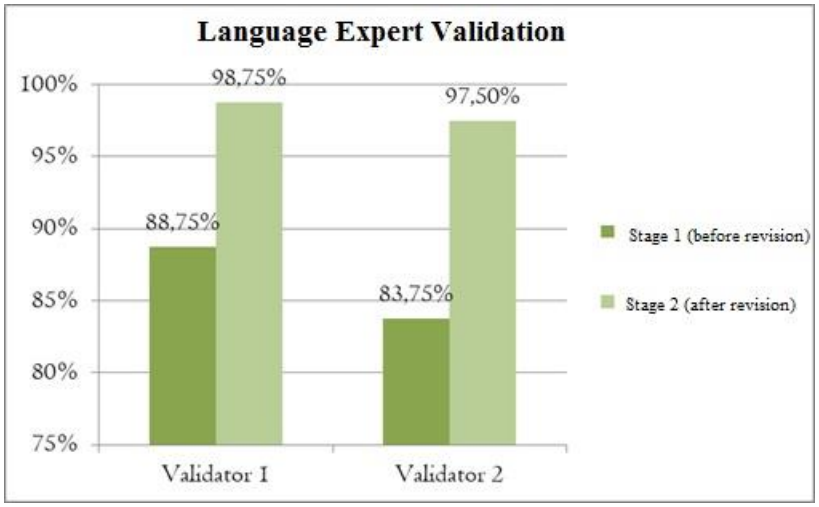


Figure 3. Language Expert Validation before and after Revision

Before carrying out learning activities, the researchers distributed a learning motivation questionnaire to determine students' learning motivation levels. Then, the learning activities were carried out using the developed Islamic-based biology smart cards. Furthermore, at the end of the learning activities, students filled out another learning motivation questionnaire. TTables4 and 5 contain the students' average learning motivation.

Table 4. The Learning Motivation of Students with Hearing Impairments

	The Average Score of the First Questionnaire	The Average Score of the Second Questionnaire	Average N-Gain Score
	61,499	82,832	0,55
Criteria	High	Excellent	Moderate

Table 5. The Learning Motivation of Students with Visual Impairments

	The Average Score of the First Questionnaire	The Average Score of the Second Questionnaire	Average N-Gain Score
	61,334	84,084	0,59
Criteria	High	Excellent	Moderate

Tables 4 and 5 display that the average N-Gain score of the first questionnaire filled out by students with hearing impairments was 61.49%. The average N-Gain score of the first questionnaire filled out by the students with visual impairments was 61.33. Furthermore, the average N-Gain score of the second learning motivation questionnaire filled out by students with hearing impairments was 82.83%. The average N-Gain score of the second questionnaire filled out by students with visual impairments was 84.08%. Therefore, the developed product effectively increases the learning motivation of students with hearing and visual impairments.

Table 6. The N-Gain Scores of Students with Hearing and Visual Impairments

No.	Category N-Gain	Number of Students	Percentage
1.	High	3	15%
2.	Moderate	17	85%
3.	Low	0	0%
	Total	20	100%

Table 6 displays the N-Gain score where three students are in the high category (15%). Furthermore, 17 students were in the moderate category with a percentage of 85%. Therefore, the average N-Gain score of the students with hearing impairments was 0 .55, and the N-Gain Score of visually impaired students was 0.59 within the moderate category.

Table 7. The Results of Paired Sample t-Test on Learning Motivation

Paired Samples Test							
	Paired Differences				T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			

					Lower	Upper			
Pa	Earl	-	4,634	1,036	-	-	-	19	,000
ir	y –	22.59	98	41	24,75	20,42	21,7		
1	Late	000			924	076	96		

Table 8. Average Difference

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Initial	63,7500	20	2,92449	,65394
	Late	86,3400	20	3,73411	,83497

Based on Table 7, the significance value of the paired sample t-test is 0.00, which is lower than 0.05. Therefore, H_0 is rejected, and H_1 is accepted, which means learning motivation differences between before and after the product application. In Table 8, the initial learning motivation questionnaire results were 63.75, and the results of the final learning motivation questionnaire were 86.43. Therefore, students' learning motivation increased after learning activities using Islamic value-based biology smart card media.

DISCUSSION

The learning media developed in this research is an Islamic-based biology smart card for hearing and visual impairments students. The developed product is a printed learning media that can help students to understand the material given by the teacher. The product poses advantages in that it contains a summary of material about the human digestive system and Islamic values related to the learning materials. The product is specifically designed for students with hearing and visual impairments because it is equipped with braille writing and QR codes that link to videos about the human digestive system. The product possesses attractive designs to encourage students' learning interests.

The researchers employed the Borg and Gall development model, which consists of ten stages. However, the researchers only applied nine stages due to time and cost limitations. The initial stage of this research was finding the potential and problems to develop the desired product. In this stage, the researchers encountered a problem in learning activities in special schools (SLB), namely the lack of learning media suitable for students with special needs. Also, there were no learning media that could increase learning motivation and help teachers deliver abstract material, such as the human digestive system. At this stage, the researchers conducted a field study or pre-research by seeking information about learning activities and learning media applied during the learning process at school, especially in biology for eleventh-grade students of special senior high school. The information-seeking activities were performed by interviewing the biology teachers at SLB-A Bina Insani and SLB Dharma Bhakti Bandar Lampung. The teachers stated that the learning was still using simple media, such as textbooks, blackboards, and school. Therefore, the students felt bored and lacked enthusiasm. The researchers developed interesting learning media by following the needs of students with hearing and visual impairments. The learning media contain material on the human digestive system with Islamic values. It is also equipped with braille writing and QR codes containing a video explanation of the human digestive system material.

The second stage was the research planning stage. This stage was performed systematically and planned by compiling specifications to be adapted to the questionnaires instrument for product validation, student response questionnaires, and learning motivation questionnaires. At this stage, the researchers collected all the information about the tools to develop the product.

The third stage was design development. The product was designed using Corel Draw X4 software. The product was also equipped with QR codes created using the QR Code Generator software. The product contained learning materials adapted to core competencies, basic competencies, and learning indicators. Besides, the product is accompanied by Islamic values related to digestive system materials, such as Quranic verses and hadith about food and drink and eating and drinking etiquette in Islam.

The next stage was the product design validation stage. The product was validated by media experts, material experts, and language experts. The validation was performed using questionnaires consisting of positive and negative statements and assessments. Several expert lecturers validated the questionnaires before the researchers distributed them.

The fifth stage was the revision after the validation or limited trial. At this stage, the validators provided input and suggestions regarding the developed product. The validation results were used as references for improving and perfecting the product. The media experts suggested adding images to the container box. The material experts suggested the researchers specify the learning materials, and one smart card should consist of only one sub-material. Next, the language experts suggested the researchers tidy up the braille writing by matching the spelling and paragraph with the size of the card.

Based on the validation, the media experts provided a score of 98.5% within the highly feasible category. The material experts provided a score of 97.32% within the highly feasible category. Lastly, the language experts provided a score of 98.12% within the highly feasible category. The results indicated that the product had a good interpretation from each expert validator.

The sixth stage was the preliminary product trial stage performed on ten students (five students with hearing impairments and five with visual impairments). This stage was performed to determine the students' responses before testing the product on a larger scale.

The seventh stage was the product revision stage after the preliminary trial. The product obtained positive responses with an excellent score percentage so that the product was suitable for biology learning activities.

The eighth stage was the product effectiveness trial involving 20 students (ten students with hearing and visual impairments). This stage aimed to assess the effectiveness of the developed product on the eleventh-grade students of SLB-A Bina Insani and SLB Dharma Bhakti Bandar Lampung. To measure the learning motivation, the researchers distributed the initial and final learning motivation questionnaires. The initial and final learning motivation questionnaires aimed to investigate the effectiveness of the developed product to increase the students' learning motivation based on the acquired N-Gain scores. The questionnaire consisted of thirty statements on learning motivation that had previously been tested for validity and reliability and had been adjusted to the indicators of learning motivation, according to Sudirman. The indicators were diligent in facing tasks, tenacious in facing difficulties, showing interest in various kinds of problems, dare to face problems, find solutions to problems, not easily discouraged when dealing with problems, prefer to work independently, not get bored quickly on routine tasks, and can defend their opinions (Sardiman, 2001).

The Islamic value-based biology smart card learning media is considered effective based on the results of the t-test. Before that, the researchers performed the prerequisite tests, namely the normality test and homogeneity test. The normality test was performed to determine whether the data were normally distributed or not. The One-Sample Kolmogorov Smirnov Test assisted by SPSS 20 obtained the value of Sig. was 0.200 > 0.05. Therefore, H_o was accepted, and it can be concluded that the data were normally distributed. The homogeneity test was performed using the Levene statistics assisted by SPSS 20 to see whether the data were homogeneous or not. The result

was that the Sig. value was 0.80 > 0.05. Therefore, H_0 was accepted, and the data were homogeneous.

The result of the paired sample t-test was 0.00 < 0.05. Therefore, H_0 was rejected, and H_1 was accepted. Furthermore, the N-Gain average scores of the initial and final motivation questionnaires were 0.61 for students with hearing impairments (moderate category) and 0.63 for visually impaired (moderate category) students. An assessment was given to 20 students as respondents to determine the effectiveness of the smart card media, namely ten students with hearing impairments who obtained a percentage of 92.02% and ten students with visual impairment who obtained a percentage of 93.92% (excellent category).

The ninth stage was the last stage of this development research, namely the product revision stage. Islamic values-based biology smart card media increases students' learning motivation with hearing and visual impairments and is feasible to be used as a medium in learning biology, especially on the human digestive system. The results are supported by Nindya Handayani Muniroh Umar, Parmin, Indah Urwatin Wusqo (2016), who state that smart card media strongly influence students' interests (Muniroh, Umar Handayani Nindya, Parmin, 2016). Also, the Islamic values-based biology smart card media helps students with hearing and visual impairments in the learning process. Yusriza Firdausi Romdhina and Sugiman (2021) found that audio media increased the imagination of visually impaired students (Yusriza Firdausi Romdhiana, 2020). The Islamic values-based biology smart card media developed by the researchers is accompanied by QR codes that contain videos explaining the digestive system material. Research by Erna Juherna, Adinda Farwati Putri, and Feby Valentina (2021) found that picture media can improve students' understanding of hearing impairments (Erna Juherna, Adinda Farwati Putri, Euis Sugihartini, Feby Valentina, Lilim Halimatul Mutmainah, 2021)

CONCLUSION

Based on the analysis, the Islamic values-based biology smart card media has been successfully developed using the research and development method described in Borg and Gall's book entitled Educational Research, An Introduction. The media development stages were carried out up to the ninth stage: research and information collecting, planning, developing a preliminary form of product, preliminary field testing, main product revision, main field testing, operational product revision, operational field testing, and final product revision.

Based on the media experts ' validation, the developed Islamic values-based biology smart card media feasibility was 98.5% within the highly feasible category. The material experts provided a score of 97.32% within the highly feasible category. Lastly, the language experts provided a score of 98.12% within the highly feasible category. The assessment scores based on students' responses were 92.02% (highly feasible category) from the students with hearing impairment and 93.92% (highly feasible category) from the students with visual impairments.

The effectiveness of the Islamic value-based biology smart card media in increasing students' learning motivation can be seen in the result of the paired sample t-test was 0.00 < 0.05. Therefore, H_0 was rejected, and H_1 was accepted. Furthermore, the N-Gain average scores of the initial and final motivation questionnaires were 0.61 for students with hearing impairments (moderate category) and 0.63 for visually impaired (moderate category) students. The researchers conclude that the Islamic values-based biology smart card media effectively increases students' learning motivation.

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