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Development of Wahdatul Ulum-Based Biology Smart Cards on Human Digestive System Material

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ABSTRACT
This study aimed to create a biology smart card integrating Wahdatul Ulum principles, focusing on the human digestive system, and ensuring that the product fulfills the criteria of validity, practicality, and effectiveness. The research followed the Research and Development (R&D) approach using the 4D development model, though it was only implemented up to the Develop stage due to time and budget limitations. The study involved 47 students from XI MIA 1 and XI MIA 2 at MAS Al-Wasliyah 22 Tembung. Instruments used for data collection included teacher interview guides, student needs analysis questionnaires, and validation sheets from media, subject matter, and Wahdatul Ulum experts. Additionally, response questionnaires were given to both students and teachers. The effectiveness of the smart card was measured through a pretest and posttest, each containing 20 multiple-choice questions. The results revealed that the developed media was highly valid (93%), very practical (96% from students and 89% from teachers), and effective, demonstrated by an N-Gain score of 0.78, categorized as high. Overall, the smart card proves to be a relevant learning tool for biology, especially for teaching abstract concepts like the human digestive system, and it contributes to enhancing students' conceptual understanding.

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1. INTRODUCTION

Education plays an important role in building human knowledge, which is the foundation of social and economic progress (Trinh, 2023). In an era of globalization and rapid technological advancement, education not only hones technical skills but also shapes character and insight, making students more prepared to adapt and solve problems (Andini et al., 2024). According to Yanti & Radian (2024), education in the information age plays a vital role in preparing human resources to adapt to rapid changes, as well as in character development and technology utilization. Additionally, digital transformation is altering teaching methods, making education more interactive and accessible, so educational institutions must prepare graduates with relevant competencies to tackle the challenges of the information age (Hasan et al., 2023).

In response to these needs, the government plays a vital role in formulating educational policies that integrate the development of both technical competencies and student character through a supportive curriculum (Yuliana & Maysaroh, 2024). This includes the provision of adequate infrastructure and consistent training to produce a high-quality generation (Rahman, 2022). Furthermore, Aisyah (2023) emphasizes that the learning process for each subject should be diverse, flexible, and meet established standards, taking into account student diversity and the demands of training to enhance graduate quality. Biology, for instance, can enhance students' competencies and character through innovative learning methods that foster critical thinking, discipline, and honesty, thereby preparing them to face modern challenges (Ali et al., 2024).

Biology education encompasses three core aspects: product, process, and attitude. Biology as a product includes concepts, generalizations, and theories; the process involves investigation, observation, and hypothesis testing; and the attitude component refers to scientific dispositions such as accuracy, honesty, concern, and decision-making ability (Tammu, 2018). These three aspects align with the concept of Wahdatul Ulum, which

integrates scientific knowledge with spiritual and moral values (Putri et al., 2025). According to Harahap et al., (2022), Wahdatul Ulum represents a vision, concept, and scientific paradigm that embodies the unity of knowledge based on the belief that all knowledge originates from divine revelation. Sari & Adlini (2024) further emphasize that Wahdatul Ulum underscores the importance of integrating science with spiritual values, allowing students to grasp biological concepts not only theoretically but also in terms of moral and ethical dimensions. An interdisciplinary approach, such as linking Qur'anic verses to subject matter, can enhance and strengthen students' understanding (Adlini et al., 2023).

The Qur'an, as the divine revelation of Allah, is the primary source of knowledge for Muslims, containing both *Qauliyah* and *Kauniyah* verses that serve as guidance for life and moral principles for humanity (Latifah & Anwar, 2022). According to Munir (2021), knowledge derived from *Qauliyah* verses reflects Allah's authority in imparting wisdom through the Qur'an and Hadith. Meanwhile, *Kauniyah* verses represent signs of Allah's power manifested in natural phenomena, forming the basis for empirical sciences. These two types of verses complement each other in drawing humans closer to Allah through both religious understanding and exploration of the natural world (Alamsyah et al., 2024). Religion and science are fundamentally integrated, and their separation is a misconception that should be addressed through the integration of scientific knowledge (Salamuddin et al., 2023). Integrating religious values into education aims to achieve core competencies and the goals of national education, namely, to cultivate intelligent individuals with noble character (Fadhila, 2021). Essentially, *Wahdatul Ulum* refers to knowledge that originates from Allah SWT (Saragih, 2024). This knowledge offers humans the opportunity to seek His love, which is an essential part of developing piety toward Allah SWT (Rafi'uddin, 2021).

However, in the current educational reality, the integration of religious and general knowledge has not yet been fully realized. Majdi (2025)explains that in biology lessons, the focus is often only on scientific aspects and material without connecting them to spiritual values that can serve as a moral and ethical foundation for students. A similar situation occurs at the Private Madrasah Aliyah in Medan, where biology education still emphasizes scientific aspects without integrating religious values. Interviews with biology teachers at one of the private Madrasah Aliyah in Medan revealed that the learning media commonly used, such as Student Worksheets (LKS), LKPD, and videos, have not fully integrated religious values. So far, spiritual values have only been conveyed verbally without the support of structured learning media, while the use of monotonous and uninnovative media further hinders the effectiveness of learning (Rhodinia et al., 2023). Therefore, there is a need for systematic and engaging efforts to integrate Biology with Islamic values. One solution is to develop Biology smart cards based on Wahdatul Ulum, which not only connect Biology concepts with Islamic teachings but are also designed interactively to enhance students' learning understanding and character development optimally.

Smart cards are visual media developed as learning products, enhanced with brightly colored designs to increase student interest and engagement (Efendi et al., 2023). This medium falls under the category of visual learning media, which has been shown to be highly effective in educational settings (Frasandy et al., 2022). One of the main advantages of smart cards lies in their compact size, making them easy to carry and use anywhere. In addition, they contain concise material, allowing students to recall information more easily and avoid boredom (Pratiwi & Gunansyah, 2022). Innovative and creative smart cards can actively engage students in the learning process (Audia et al., 2021). According to Miskiyah & Safitri (2023), smart cards motivate learners to participate in discussions and solve problems, as the subject matter is presented in an appealing and accessible format (Rosidha, 2020).

Based on previous research, several studies have developed biology learning media using various approaches. Damayanti & Jayanti (2024)developed character education-based biology smart cards on the immune system material, while Tomi et al. (2020) created smart card-based learning media for the cell material in Grade XI MIA at Islamic Senior High Schools (MA). Along with technological advancements, smart card-based learning media have been integrated with augmented reality (AR) and digital platforms. Emawati (2021) introduced AR-based biology smart cards for the Animalia topic in Grade X of senior high schools (SMA/MA), while Lubis et al. (2023) developed digital-based smart cards to improve science learning outcomes for students at Madrasah Ibtidaiyah.

Furthermore, Syifa (2021) developed Islamic-based smart cards for deaf and blind students on the subject of the digestive system. However, the development of this media is still limited to students with special needs, using Braille, and the material only covers digestive organs without further exploration of the digestive system as a whole (Syifa, 2021). No one has comprehensively integrated biological concepts with the Wahdatul Ulum approach in learning media. This opens up opportunities for the development of Wahdatul Ulum-based biology smart cards on other biological subjects, one of which is the human digestive system.

The selection of the human digestive system as the subject matter in this study was based on interviews with a biology teacher from a private *Madrasah Aliyah* in Medan. During the interview, the teacher stated that the human digestive system is considered one of the most challenging topics for students to understand. This is primarily because most digestive processes occur internally and cannot be directly observed, making it difficult for students to visualize and comprehend the concepts in a concrete manner. This aligns with the findings of Septiani et al. (2024), who reported that students experience difficulties in understanding physiological concepts

in digestive system topics due to the internal nature of the processes, which are not visible to the naked eye. Furthermore, the lack of learning media that matches the characteristics of the material contributes to students' learning difficulties (Hertanti & Fadiana, 2024). To address this issue, it is necessary to develop a smart card-based learning media that presents the material comprehensively while integrating Wahdatul Ulum values. The smart cards are designed with additional features such as QR codes, "Did You Know" facts, and discussion questions. A QR code (Quick Response code) is a two-dimensional digital code that can be scanned using devices such as smartphones to access supplementary information quickly (Ariyandi & Handayani, 2022), including educational videos, animations, or interactive explanations. Moreover, the smart cards are flexible in their application, making them suitable for use in various learning environments, whether in individual or group settings.

The importance of understanding the material on the human digestive system in the Qur'an is evident in several verses that relate to the human digestive system. These verses are scattered throughout various surahs that explain the process of food intake, its benefits for the body, and the importance of maintaining a good diet. Some of the surahs that discuss this include (QS. Al-Mu'minun: 79), (QS. An-Nahl:69), (QS. Surah Abasa:24), (QS. Surah Al-Baqarah:29), and (QS. Al-A'raf:31) (Widiyati,2023). This indicates that the Qur'an has provided guidance on the digestive system and the importance of maintaining health through the food we consume (Andriyani, 2019).

Based on the background description and previous research studies, this study aims to develop a valid, practical, and effective Wahdatul Ulum-based biology flashcard on the human digestive system. These flashcards are expected to contribute to improving the spiritual and moral aspects of students, shaping better character, and fostering awareness of the importance of connecting science with religious teachings in everyday life.

2. RESEARCH METHOD

This research is classified as R&D (Research and Development) research because it will produce a product (Sugiyono, 2019) using the 4D development model. According to Thiagarajan et al. (1974), as cited in Slamet (2022), this model consists of four stages of development, namely Define, Design, Develop, and Disseminate. However, this approach is limited to the development stage only, due to time and cost constraints.

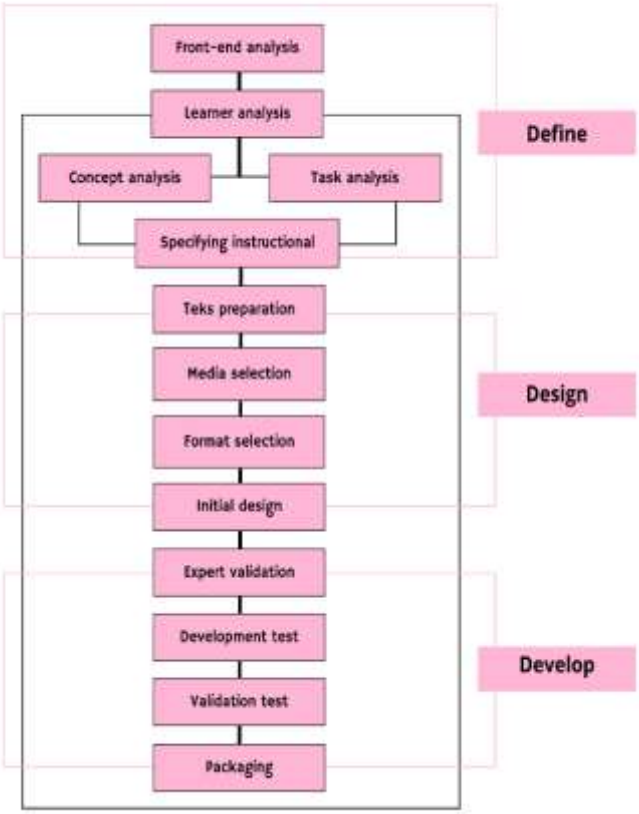

Figure 1. Flowchart of the 4D Development Model

(Source: Thiagarajan et al., 1974).

Table 1. Stages Conducted by the Researcher

Stage	Component	Activities
Define	Front-end analysis	At this stage, potential opportunities and existing problems are identified as the foundation for developing the intended product.
	Learner analysis	This stage was carried out by distributing a student needs analysis questionnaire containing various questions relevant to the issues faced by the learners.
	Concept analysis	An interview was conducted with a biology teacher to identify which biology topics are challenging to teach and to determine the content to be included in the learning media to be developed
	Task analysis	This stage aims to identify the learning tasks required to support instructional needs within the selected material.
	Specifying instructional objective	Determining learning outcome indicators based on (Permendikbud, 2018) Permendikbud No. 37 of 2018 and the Merdeka Curriculum.
Desain	Teks preparation	Content analysis of the Biology textbook for grade XI (K13 and Merdeka Curriculum).
	Media selection	The selected media were adapted to students' needs in order to address the identified learning problems.
	Format selection	This stage involves selecting the physical form, size, color, font type, and printing materials of the learning media
	Initial design	The smart card contains instructional content, tasks, illustrations, QR codes, videos, 'Did You Know' sections, and relevant Qur'anic verses related to the human digestive system.
Develop	Expert appraisal	Product evaluation by media experts, material experts, and Wahdatul Ulum experts.
	Developmental tesing	Testing the product on real subjects, obtaining feedback, making improvements, and retesting for product effectiveness.

The population in this study consisted of all grade XI MIA students at MAS Al-Wasliyah 22 Tembung, North Sumatra. The research subjects comprised 47 students selected through purposive sampling, a technique in which samples are intentionally chosen based on specific criteria relevant to the research objectives. These subjects were divided into two groups: 12 students from class XI MIA 2 participated in the practicality testing of the media, and 35 students from class XI MIA 1 were involved in the effectiveness testing. The selection of classes XI MIA 1 and XI MIA 2 was based on recommendations from biology subject teachers and considerations that these classes possessed characteristics suitable for the research needs, including student readiness, active engagement in the learning process, and alignment with the subject matter being developed.

The instruments used in this study included a needs analysis in the form of teacher interview sheets and student needs analysis questionnaires. Validation sheets, consisting of assessments by media experts, subject matter experts, and Wahdatul Ulum experts, were employed to collect data related to the validity of the developed product. For the practicality test, response questionnaires were distributed to both teachers and students involved in the limited trial to determine whether the developed media could be applied practically in the learning process. Meanwhile, the effectiveness test was conducted through instructional implementation over two sessions. The comparison of learning outcomes before and after using the biology smart card was measured using written tests consisting of 20 multiple-choice questions administered as pretests and posttests. The purpose of this evaluation was to assess students' understanding of the human digestive system material after utilizing the learning media.

The data analysis techniques employed in this study consisted of both qualitative and quantitative methods. Qualitative analysis was used to interpret information obtained through interviews and expert feedback, including input from subject matter experts, media experts, and Wahdatul Ulum experts, regarding the developed product. Meanwhile, quantitative analysis was applied to data obtained from expert validation questionnaires assessing product feasibility, as well as practicality questionnaires completed by teachers and students. These data were analyzed using a Likert scale. The assessment guidelines for expert validation sheets and response questionnaires consisted of five criteria: very good, good, fair, poor, and very poor, with scores ranging from 1 to 5 for each criterion (Sugiyono, 2019).

The validation and practicality sheets were calculated using Formula 1, and the results were analyzed based on percentage criteria as shown in table 2.

$$\textbf{Percentage} = \frac{\textbf{Total score obtained}}{\textit{Maximum possibel score}} \; \textit{X} \; \textbf{100 \% .....Formula 1}$$

Table 2. Criteria for the Validity and Practicality of the Biology Smart Cards

Score Achievement	Level of Validity
81%-100%	Very valid / Very practical
61%-80%	Valid / Practical
41%-60%	Less valid / Less practical
21%-40%	Invalid / Impractical
0%-20%	Very invalid / Very impractical

(Source: Ernawati & Sukardiyono, 2017)

To determine the effectiveness of the biology smart cards, the average normalized gain (N-Gain) was calculated. The improvement before and after the use of the smart card media was measured using the N-Gain formula, as follows:

$$\textbf{N-Gain:}\frac{\textbf{Posttest Score} - \textbf{Pretest Score}}{\textbf{Maximum Score} - \textbf{Pretest Score}} \ldots\ldots\ldots \text{ Formula 2}$$

Table 3. N-Gain Classification for the Effectiveness of Biology Smart Cards According to Hake (1999)

Percentage (%)	Criteria	Description
$0{,}70 \leq n \leq 1{,}00$	High	Effective
$0{,}30 \leq n \leq 0{,}70$	Medium	Moderately Effective
$0{,}00 \leq n \leq 0{,}30$	Low	Less Effective

(Source : Kolopita et al., 2022)

3. RESULT AND DISCUSSION

Based on the research conducted, a biology smart card learning media based on the Wahdatul Ulum approach was developed for the human digestive system topic for Grade XI students at MAS Al-Wasliyah 22 Tembung. This media was developed using the 4D model (Define, Design, Develop, Disseminate). However, due to budget constraints, the research was limited to the development (Develop) stage only. The systematic stages involved in the development of the Biology Smart Card media are presented as follows.

Table 4. Development Stages of Biology Smart Card Learning Media

Stage	Component	Activity Outcome
Define	*Front-end analysis*	The results of the preliminary analysis indicate that biology instruction, particularly in the topic of the human digestive system, has not yet optimally integrated Islamic values. Despite being situated within an Islamic school environment, the Wahdatul Ulum approach is not yet reflected in the learning media employed. Teachers still rely on conventional materials such as student worksheets (LKS), student activity sheets (LKPD), and standard videos, without utilizing interactive media such as smart cards. This situation highlights the need for the development of Wahdatul Ulum-based smart cards as an effective and engaging learning medium.
	Learner analysis	Based on the results of the needs analysis questionnaire, students require engaging and contextual learning media to better understand biological concepts and relate them to Islamic values.
	Concept analysis	Interviews with biology teachers revealed that the human digestive system is difficult for students to understand due to numerous terms and complex biological processes. Currently, there is no available learning media that effectively integrates biological concepts with Islamic values. The results of this analysis were used to determine the content to be included in the biology smart card media in a concise, visual, and integrative format.
	Task analysis	Learning tasks are designed using flashcards and interactive activities such as puzzles and posters to test understanding and apply knowledge creatively, in order to encourage student engagement and integrate biological concepts with Islamic values.
	Specifying instructional objective	The learning goals were derived in accordance with the Regulation of the Ministry of Education and Culture No. 37 of 2018. In the context of the 2013 Curriculum, these goals are aligned with Basic Competencies (KD) 3.7 and 4.7. The learning indicators reflect a comprehensive approach by

Stage	Component	Activity Outcome
		encompassing cognitive, psychomotor, and affective domains, while also incorporating Wahdatul Ulum values throughout the instructional design.
Desain	*Teks preparation*	An outline of the human digestive system material was developed for the biology smart card media. The content was organized sequentially and aligned with the learning objectives. It includes topics such as food and nutrients, energy requirements and balance, the human digestive system, as well as integration with relevant verses from the Qur'an.
	Media selection	The selected medium was based on the characteristics of the subject matter and the learners' needs, namely the Wahdatul Ulum-based biology smart cards. This medium addresses the limited integration between biological concepts and Islamic values. The cards were designed to be engaging, contextually relevant, and infused with spiritual values.
	Format selection	The smart card media was designed with dimensions of 10.5 cm × 14.5 cm using the Canva application, incorporating a combination of Tarif and Arimo fonts, with black and brown text colors. The cards were printed on 230-gram TIK paper, selected for its durability and its ability to produce sharp and clear print quality for both text and images, thereby enhancing the overall visual appeal and functionality of the learning media.
	Initial design	The initial design of the smart card comprised four main components: (1) Pre-Introduction: The card packaging includes a QR code linked to articles and instructional videos integrated with relevant Qur'anic verses; (2) Introduction: This section presents usage instructions, core competencies, basic competencies, and learning indicators; (3) Content: The digestive system material is presented in a visual and integrative manner; (4) Task Section: Group assignments are provided in the form of puzzles and poster creation, which students are instructed to upload to their Instagram Stories.
Develop	*Expert appraisal*	Product evaluation was conducted by media experts, subject matter experts, and Wahdatul Ulum experts.
	Developmental tesing	The product trial was conducted in two phases: an initial small-scale trial to gather feedback from teachers and students, followed by product revisions based on the input received. After the revisions, a large-scale trial was carried out to evaluate the effectiveness of the developed product.

During the development phase, the media underwent validation, practicality, and effectiveness testing. The validation process was conducted at the initial stage, aligning with Sugiyono (2017) perspective that expert validation should be completed before implementation to determine the product's viability. Three experts were involved in evaluating the media's feasibility, including aspects related to content quality, media design, and the integration of Wahdatul Ulum values. The outcomes of this validation are detailed in the following table:

Table 5. Validation Results of the Product by Media, Content, and Wahdatul Ulum Experts

Expert	Assessment Aspect	Statement Items	Score	Maximum Score	Percentage	Validation Score (%)	Criteria
Media	Graphics	8	38	40	95%	**93%**	**Very Valid**
	Presentation	8	38	40			
	Total		**76**	**80**			
Material	Content	12	55	60	91%		
	Presentation	2	9	10			
	Total		**64**	**70**			
Wahadtul Ulum	Relevance to Qur'anic Verses	4	18	20	91%		
	Material Presentation	3	15	15			
	Contextual Essence	2	8	10			
	Total		**41**	**45**			

Based on the data presented in Table 5, the Biology Smart Card media based on Wahdatul Ulum achieved an average validation score of 93%, categorized as "Very Valid." This result covers three main aspects: media

design, content, and the integration of Islamic values. The media aspect received the highest score (95%), indicating that its visual appearance, layout, and readability align with the principles of multimedia learning, where effective visuals enhance students' understanding (Mayer, 2017). The content aspect scored 91%, reflecting its alignment with the curriculum as mandated in the Regulation of the Minister of Education and Culture No. 37 of 2018 and supported by Anharuddin & Prastowo (2023), who emphasizes the importance of structuring materials in accordance with Core and Basic Competencies (KI and KD). Similarly, the Wahdatul Ulum aspect also received a 91% score, demonstrating the successful integration of Islamic values into biology content, in line with the views of Muhaimin (2017) and Nuriyati & Chanifudin (2020) who advocate for holistic education that combines scientific knowledge with spiritual and moral development.

However, prior to obtaining the validation results as presented in Table 5, the Biology Smart Card underwent revisions based on suggestions and feedback provided by each expert validator. All recommendations were carefully addressed through relevant and appropriate improvements. A detailed summary of the suggestions and the corresponding revisions is presented in the following table:

Table 6. Suggestions and Revisions from the Experts

Expert	Suggestion	Revision	Figure
Media	Improvements were made to the front cover design to match the topic of the material, and the author's biography was added to the back cover.	The front cover was redesigned to match the digestive system theme, and a biography was added.	
	The layout of several pages has been improved because they were too text-heavy and visually suboptimal.	Excessive text has been reduced and visual elements (images or illustrations) have been added to make it more interesting and easier to understand.	
Material	Table of BMI classification according to WHO for clarification	Clarify the BMI classification table with a more informative and easy-to-understand format.	

	Include supporting instructional videos to enhance students' understanding of the material.	Adding educational video links via QR codes to help students better understand the material	
Wahdatul Ulum	Include hadits that are relevant to the material.	Adding content with relevant Hadits	
	The writing of the verses is adequate, but the integration of knowledge is not yet apparent.	Adding explanations that connect verses from the Qur'an with biological concepts in more detail	

Based on the data presented in Table 6, all suggestions provided by the respective expert validators have been systematically addressed as part of efforts to enhance the quality and effectiveness of the learning media, particularly in supporting students' comprehension of the presented material. The revisions focused on delivering concise and engaging information to avoid cognitive overload caused by overly dense text. The reduction of text volume and the inclusion of visual elements align with instructional design principles that emphasize the importance of visualization in facilitating conceptual understanding. This approach is supported by findings from Fitriyaningsih et al. (2022), which highlight the significance of appealing layout and proper placement of visual elements in improving the effectiveness of biology learning. In line with this, Nandari et al. (2023) also emphasize that well-crafted visual design and media interactivity can enhance student engagement and comprehension. These findings substantiate the rationale for improving the media's cover design and reducing text density to optimize its pedagogical impact.

Furthermore, improvements in the material aspect were made to enrich content and enhance student comprehension. One such effort included the integration of instructional video links via QR Codes embedded in the smart cards, facilitating the visualization of abstract biological concepts such as the human digestive system. This innovation aligns with the findings of Gulo et al. (2024) and Wulandari & Sayekti (2020), who emphasized

that QR Code-based learning media are highly favored by both teachers and students due to their ability to provide independent and convenient access to supplementary materials. The use of visual media and self-directed learning tools plays a crucial role in improving students' understanding.

In addition, the integration of Wahdatul Ulum values was strengthened by including relevant hadiths and clarifying the connections between Qur'anic verses and biological concepts. This effort aimed to foster a holistic understanding that unites scientific knowledge with Islamic values. Such an approach is in line with the Wahdatul Ulum principle, which emphasizes the integration of religious and general sciences. This integration is supported by Ramadhani et al. (2023), who assert that it contributes to the development of students' comprehensive understanding. Furthermore, Sabri et al. (2023) emphasize that expert validation plays a crucial role in ensuring the content of instructional materials meets eligibility standards and is appropriate for classroom implementation.

After validation by experts, a practicality test was conducted to evaluate the extent to which the Biology Smart Card could be effectively implemented in the learning process. This test involved both teachers and students using a response questionnaire instrument that had been previously developed. The results of the practicality test are presented in the following figure:

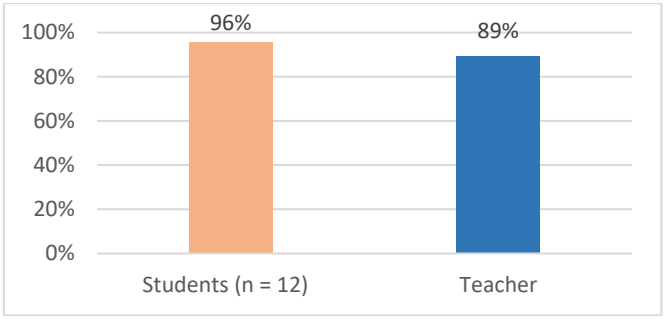

Figure 2. Percentage of Student and Teacher Response Results

Based on the questionnaire results presented in Figure 2, the practicality percentage reported by students reached 96%, while teachers reported a score of 89%. Both values fall within the "Highly Practical" category, indicating that the instructional media is easy to use, comprehend, and aligns well with the learning needs. Students perceived the biology flashcards as visually appealing, easy to understand, and effective in reinforcing biology concepts. Similarly, teachers acknowledged that the Wahdatul Ulum-based biology flashcards facilitated the delivery of biology content integrated with Islamic values. These findings are in accordance with the study by Plomp & Nieveen (2010), which asserts that a learning tool is considered practical when it can be easily used by the target users and supports the efficiency of the learning process in real-world settings. This indicates that the developed media meets the practicality criteria. Furthermore, the percentages reflect a high level of user-friendliness and acceptance in the field. Sugiyono (2017) also emphasizes that such levels of usability are indicative of a highly practical product in educational development.

To assess the improvement in students' understanding, an effectiveness evaluation was carried out at the final development phase of the Wahdatul Ulum-based Biology Smart Card. This assessment utilized a pretest-posttest approach to measure the influence of the media on student learning achievements. The outcomes of this evaluation are illustrated in the chart and table below.

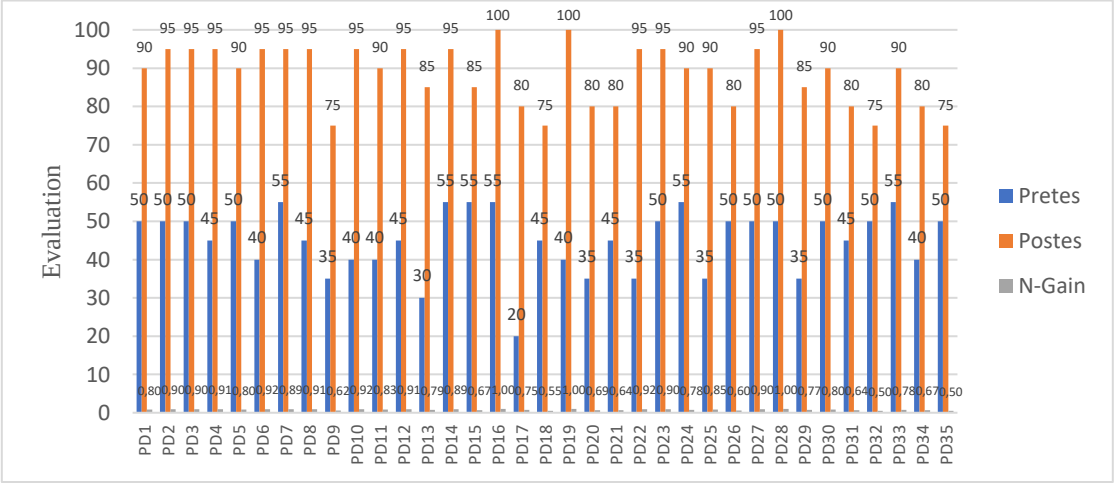

Figure 3. Pretest and Posttest Results

Table 7. N-Gain Score

Score	Average Score	Maximum Score	N-Gain Score	Criteria
Pretest (n=35)	45,0	100	0,78	High/Effective
Posttest (n=35)	87,9	100		

In addition, to measure the enhancement of students' learning achievements following the use of the Biology Smart Card based on Wahdatul Ulum, data from the pretest and posttest were analyzed using the N-Gain formula. The results revealed that the average pretest score of 45.0 increased to 87.9 in the posttest, with a maximum score of 100. The calculated N-Gain score was 0.78, which falls into the "high" or "effective" category. This finding aligns with previous studies demonstrating the effectiveness of smart card media in enhancing student learning outcomes. Hanim & Eriawati (2018), for instance, developed an identification card-based medium for teaching Protists and reported an N-Gain of 0.72, which was categorized as high. Similarly, research by Muhibbi et al. (2017) on the use of smart card game media for plant classification topics also showed a significant learning gain, with an N-Gain score of 0.78, also falling under the high category. Therefore, the implementation of the Wahdatul Ulum-based Biology Smart Card media in this study is strongly supported by earlier research findings that highlight the effectiveness of card-based media in improving students' academic achievement.

The implementation of the Wahdatul Ulum-based Biology Smart Card enables students to engage actively in the learning process. This approach stimulates students' curiosity about how biological knowledge is explored and discussed within the Qur'an and Hadith. This aligns with the perspective of Ridwan et al. (2017), who emphasized that biology education is inherently connected to Islamic values, as it deals with all creations of Allah SWT. In essence, biology serves as a bridge to religious truth, reinforcing students' faith and understanding of the Qur'anic verses related to the natural world.

Thus, this medium is worthy of being a valid, practical, and effective innovative learning alternative for human digestive system material in Madrasah Aliyah. These Smart Cards are expected to not only improve students' mastery of biological concepts, but also develop their spiritual and moral aspects, shape better character, and foster awareness of the importance of connecting science with religious teachings in everyday life.

4. CONCLUSION

The findings of this study suggest that the biology smart cards developed with a Wahdatul Ulum approach, focusing on the human digestive system, fulfill the requirements of a valid, practical, and effective learning tool. Regarding validity, the media obtained an average score of 93%, which classifies it as "highly valid." In terms of practicality, student responses averaged 96%, while teachers rated it at 89%, indicating the media is both accessible and easy to implement-thus considered "highly practical." As for effectiveness, the instructional tool achieved an N-Gain score of 0.78, placing it in the "high" or "effective" category. These results confirm that the developed media is appropriate for classroom use and can serve as a valuable resource in supporting biology instruction.The limitation of this study lies in its scope, which only reached the development stage (Develop) due to time and budget constraints, resulting in the dissemination stage (Disseminate) not being conducted optimally. Moreover, the media was only tested on the topic of the digestive system, so its effectiveness for other biology topics remains unknown. It is recommended that future research proceed to the Disseminate stage and examine the effectiveness of the media on different biological materials.

5. ACKNOWLEDGEMENT

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