Bioedukasi
Jurnal Biologi dan Pembelajarannya
Vol. 23 No 2, June 2022, page 270-282
e-ISSN: 2580-0094; p-ISSN:1693-3931
DOI: 10.19184/bioedu.v23i2.53754
bioedukasi.unej.ac.id/index.php/BIOED

Development of TikTok-Based Biology Learning Media on Digestive System Material Integrated with *Wahdatul 'Ulum* for Grade XI Science Students at MAN Simalungun

Nadia Bela Amanda[1], Rohani[2]
[1,2]Biology Education, Faculty of Tarbiyah and Teacher Training, State Islamic University of North Sumatra, Medan, Indonesia

Article Info
Article history:
Received June 17, 2025
Revised June 24, 2025
Accepted June 24, 2025

Keywords:
Digestive system,
TikTok,
Wahdatul 'Ulum

ABSTRACT
State This study aims to develop a learning medium in the form of TikTok based instructional videos on the digestive system material integrated with the *Wahdatul 'Ulum* concept, which is valid, practical, and effective. The research employed the Research and Development (R&D) method using the 4D model (Define, Design, Develop, and Disseminate), but was limited to the development stage due to time and resource constraints. The trial subjects were students of class XI Science 1 at MAN Simalungun. The instruments used included teacher interviews and student needs analysis questionnaires, validation sheets from media experts, subject matter experts, and *Wahdatul 'Ulum* experts, as well as teacher and student response questionnaires consisting of 10 validated multiple-choice items. The results showed that the media was highly valid (media: 97.3%, content: 97.5%, *Wahdatul 'Ulum*: 86.6%), highly practical (student responses: 97.2%, teacher responses: 100%), and effective, indicated by an increase in average student scores from 53.93 to 90.53 and an N-Gain score of 0.79 (categorized as high/effective). Therefore, the TikTok-based biology learning media is considered feasible for use in the learning process.

This is an open access article under the CC BY-SA license.

Corresponding Author:
Nadia Bela Amanda
Biology Education Study Program, Faculty of Tarbiyah and Teacher Training State Islamic University of North Sumatra, Medan,Indonesia
Jalan William Iskandar Street, Pasar V, Medan Estate, Percut Sei Tuan Subdistrict, Deli Serdang Regency, North Sumatra 20371, Indonesia
Email: nadiabelaamanda@uinsu.ac.id

1. INTRODUCTION

Biology learning at MAN Simalungun continues to face several challenges, including low student motivation, difficulties in understanding abstract concepts, and the limited availability of engaging and contextually relevant learning media. In the digital era, education is increasingly influenced by the Fourth Industrial Revolution, which emphasizes the integration of digital technologies into the teaching and learning process (Julita & Purnasari, 2022). The use of technology and information plays a crucial role in enhancing productivity in education (Godin & Terekhova, 2021). Changes and innovations are expected to affect the curriculum, learning processes, educational paradigms, instructional technology, and the integration of ICT in education (Agustini & Meliyawati, 2022). A relevant solution is the use of TikTok as a learning medium, as it effectively presents content in a visual, concise, and engaging format, thereby enhancing student engagement and understanding of biology concepts.

However, the development of the digital era brings both benefits and challenges to character building in education (Rukhmana et al., 2024). The alignment of Islamic knowledge with general science has become increasingly necessary (Rizki, Arif & Wati, 2019). The integration of science and religious values in learning should include fundamental principles, such as connecting Qur'anic verses with subject matter (Faeha et al., 2019). Instilling Islamic values is crucial, considering the impact of globalization on education (Cholil, 2019).

Fundamentally, improvements in the learning process cannot be separated from the role of teachers as facilitators (Berutu et al., 2024). Educators must integrate technology to ensure that the learning process runs optimally (Asrofunnisa & Hakim, 2024). echnological advancements are expected to enhance the quality of education, both in terms of content and instructional media (Asih et al., 2023). Learning media play a crucial role in supporting the teaching and learning process (Wulandari et al., 2023). Media function as tools for

delivering educational information (Muhammad et al., 2023). Instructional media help convey messages that stimulate students, making learning more effective (Bohang & Reza, 2018). The development of ICT has transformed learning media by introducing videos, visuals, audiovisuals, animations, and multimedia (Fikri & Madona, 2018).

Technological advancements support innovation in instructional media through the use of hardware such as smartphones and software applications that allow users to easily download apps one of which is TikTok (Pranoto & Agraini, 2021). According to Wibowo & Wahyu (2024) the use of TikTok can enhance student engagement in innovative ways. Launched in September 2016, TikTok is a Chinese social media application that focuses on music video content (Herlisya & Wiratno, 2022). A study by Bohang & Reza (2018), reported that TikTok achieved the highest number of downloads 45.8 million surpassing other major platforms such as YouTube, WhatsApp, Facebook, and Instagram. TikTok offers features that support educational content and is popular among Generation Z, making it suitable for delivering academic information (Wafi & Yanuar, 2023).

One of the most recent learning resources developed in the past few years is instructional video content on the TikTok application. Ahdi et al. (2023) eveloped TikTok-based learning media for physical education (PJOK). Amalia et al. (2024) created TikTok video content as a learning medium to teach speaking skills. Azizah et al. (2023) developed TikTok-based instructional media on chemical equilibrium topics. The aforementioned studies highlight TikTok's potential as an accessible and contextually relevant medium for biology education. However, most existing research remains limited to non-biology subjects and has yet to specifically explore its application to the topic of the digestive system or its integration with Islamic values such as *Wahdatul 'Ulum.*

Linguistically, *Wahdat al-'Ulum* is derived from the words "wahdat" meaning unity, and "'ulūm," the plural form of "'ilm," meaning knowledge (Nasution et al., 2024). Educators are expected to relate subject matter to the values of *Wahdatul 'Ulum* (Junaedi & Wijaya, 2021). his situation forms the basis for the importance of integrating subject content with the concept of *Wahdatul 'Ulum* into instructional media in the form of videos on the TikTok application. According to Pandar & Sahid (2024), TikTok supports multimedia learning by enhancing motivation, learning outcomes, and interaction through audiovisual media. TikTok-based audiovisual media is particularly effective as it combines sound with dynamic visuals (Afifah, 2023). The use of the TikTok application supports learning needs, increases students' interest in learning, and aligns well with the characteristics of today's learners, who are highly familiar with digital environments, especially mobile devices (Muh. Umran et al., 2023).

The main issue underlying the development of TikTok-based learning media at MAN Simalungun is students' low motivation and their difficulty in understanding biology content, particularly the topic of the digestive system. This topic is considered abstract, as it involves internal bodily processes that cannot be directly observed. This challenge is reflected in preliminary interviews with biology teachers, which revealed that most students showed low enthusiasm during conventional lessons and struggled to retain and connect abstract and complex concepts.

Based on the student needs survey, it was found that biology instruction at MAN Simalungun is still predominantly lecture-based. The dominant use of the lecture method in biology instruction has specific impacts on student learning outcomes, particularly in the form of decreased active participation, low learning motivation, and limited understanding of concepts in depth. Textbooks remain the primary learning resource, which students find unengaging and monotonous. Additionally, as an Islamic-oriented school, teachers have not yet integrated biology instruction with Islamic values or relevant Qur'anic verses. This gap highlights an urgent need to develop more engaging, digitally relevant learning media that can present material in a visual and interactive manner. Therefore, the use of TikTok as an instructional medium is seen as a potential solution to bridge this gap, with the hope of significantly improving student motivation and learning outcomes.

One effort to address these instructional challenges is by utilizing relevant and engaging learning media, such as TikTok-based instructional media. In high school biology, learning materials often involve abstract and microscopic concepts, such as the digestive system. A study by Mardiah et al., (2021), revealed that students' interest categorized as moderate at 65.15% influences their learning difficulties. This indicates a relatively low level of student engagement with the topic of the digestive system.

Numerous researchers have developed TikTok-based instructional media for biology subjects. For example, Zahirah (2021), developed TikTok-based learning media on the excretory system, Anngie (2023), created TikTok-based media for the circulatory system, and Lailiya (2022) eveloped TikTok application-based videos on the reproductive system. However, these developmental studies have not yet integrated the concept of *Wahdatul 'Ulum*, making this a novelty in the field of biology education development. In this media, the integration of biological explanations of the digestive system with *ayat kauniyah* (Qur'anic verses related to natural phenomena) represents the application of an integrative approach. This supports the holistic goals of Islamic education, which aim to develop students who are not only intellectually capable but also spiritually conscious.

Based on the aforementioned background, this study aims to develop TikTok-based biology learning media on the digestive system material integrated with the *Wahdatul 'Ulum* concept for Grade XI students at MAN Simalungun that is valid, practical, and effective, as well as to integrate biology content with Islamic values. TikTok was chosen as the instructional medium due to its ability to present content in a concise, visual, and engaging manner, aligning with students' learning styles and digital habits, thus making it more effective in enhancing understanding and learning outcomes.

2. RESEARCH METHOD

This study employed a Research and Development (R&D) method, which involves the creation of new products or the improvement of existing ones while ensuring their accountability (Widodo & Hanifah, 2020). he research design adopted the 4D development model, which consists of four stages: Define, Design, Develop, and Disseminate (Johan et al., 2023). However, this study was limited to the development stage due to time and resource constraints. The dissemination stage was not carried out, as it requires a longer period of time, involving large-scale implementation and continuous evaluation. The dissemination stage is essential for expanding the product's use and gathering broader feedback. However, due to time and resource constraints, its absence limits the study's scope to MAN Simalungun, restricting the generalizability of the results. Despite this, the product has undergone expert validation, practicality testing by teachers and students, and effectiveness testing through improved learning outcomes, ensuring its quality within the current context.

This study was conducted at MAN Simalungun during the 2024/2025 academic year, involving 28 students from class XI MIPA as research subjects. The sample was selected using purposive sampling, considering that this class had previously shown low learning outcomes and motivation in biology, particularly in the topic of the digestive system. The decision to choose this class was based on initial observations that indicated students' difficulties in understanding abstract biological concepts, such as the processes of digestion in the human body. This made the class a relevant group to test the effectiveness of TikTok-based learning media in improving students' understanding and motivation in learning this material.

Figure 1. Stages of the 4D Development Model (Author, 2025)

The research procedure began with the Define stage, which consists of: (1) Front-end analysis, where the researcher identifies and establishes the fundamental research problem to develop the desired product. (2) Learner analysis, in which a needs assessment questionnaire is distributed to students. (3) Concept analysis, which involves conducting interviews with biology teachers about the biology content and challenges in biology teaching, followed by determining the material to be developed. (4) Task analysis, to identify the tasks within the content that are necessary for the learning process. (5) Learning objective analysis, which helps summarize the findings from the concept and task analyses to define the behavior of the objects being studied. Additionally, this stage serves to ensure the research remains focused on its original objectives during the product development process.

The Design stage involves preparing the content and designing the product to be developed. This stage includes: (1) Preparation of text: the content is reviewed based on the digestive system material to be developed, which is aligned with the student textbook for the Merdeka Curriculum in Grade XI Science at MAN Simalungun. (2) Media selection: the media are chosen based on student needs, as identified through the prior analysis of issues. (3) Format selection: the TikTok-based learning media is designed using the Canva application, incorporating engaging elements and fonts, with an appealing combination of colors to enhance its attractiveness.

Development stage: This stage consists of expert validation, which includes material validators, media validators, and *Wahdatul 'Ulum* validators. Following this, a product trial is conducted by distributing the

developed product in Grade XI Science classes at MAN Simalungun to assess the product's effectiveness as evaluated by both teachers and students.

Research Instruments

The subjects in this study were the 11th-grade science students at MAN Simalungun. The instruments used in this study included interview sheets and a student needs analysis questionnaire. Additionally, validation sheets were employed, consisting of material, media, and *Wahdatul 'Ulum* experts to assess the validity of the product. A response questionnaire was also administered to both teachers and students to measure the practicality of the developed media, which consisted of a video on the TikTok application. Lastly, pre-tests and post-tests were conducted, consisting of 20 multiple-choice questions answered by students to evaluate the effectiveness of the TikTok-based instructional videos.

Data Analysis Technique

The product validation test was conducted to assess the level of validity by distributing questionnaires to media experts, material experts, and *Wahdatul 'Ulum* experts. The questionnaire used a Likert scale, where each variable was measured and broken down into specific indicators. The score categories in the Likert scale are as follows (Sugiyono, 2019).

Table 1. Likert Scale

Category	Score
Very Good (VG)	5
Good (G)	4
Fair (F)	3
Poor (P)	2
Very Poor (VP)	1

Source: (Sugiyono, 2019)

Validation Data Analysis

The validation involved three experts: a media expert, a material expert, and a *Wahdatul 'Ulum* expert. The analysis of the validation results from these three experts was processed using the formula by Samitra & Harmoko (2021), as follows:

$$Persentase = \frac{Total\ Score\ Obtained}{Maximum\ Possible\ Score}\ X\ 100\%$$

The results of the validation from the three experts are categorized in the table below:

Table 2. Criteria for Validity of Learning Media

Prensentase	Category
81-100%	Highly Valid
61-80%	Valid
41-60%	Moderately Valid
21-40%	Less Valid
0-20%	Not Valid

Source: Samitra & Harmoko (2021)

Practicality Data Analysis

The practicality analysis was obtained through a questionnaire consisting of 10 statements regarding the use of the developed media, which was then calculated using the formula by Arikunto (2011) cited in Febriyana (2023) as follow :

$$Persentase = \frac{Total\ Score\ Obtained}{Maximum\ Possible\ Score}\ X\ 100\%$$

The following is the categorization of the practicality range for the developed media:

Table 3. Practicality Criteria for Learning Media

Prensentase	Category
0-20%	Very low or poor practicality
21-40%	Low or poor practicality
41-60%	Moderate or fairly good practicality
61-80%	High or good practicality
81-100%	Very high or excellent practicality

Source: Febriyana (2023)

Effectiveness Data Analysis

The effectiveness analysis was conducted by testing student learning outcomes through pre-tests and post-tests consisting of 20 multiple-choice questions at levels C1-C5, which were calculated using the N-Gain formula by Kolopita et al. (2022):

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

The classification of the effectiveness of using TikTok-based biology learning media is informed by the category levels based on the N-Gain score, as shown in the table below:

Table 4. N-Gain Normality Criteria

Skor N-Gain	Classification	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 TikTok-based biology learning media was developed on the topic of the digestive system, integrated with the *Wahdatul Ulum* concept, for Grade XI Science students at MAN Simalungun. This TikTok-based instructional video was developed using the 4D model. However, the research was limited to the development stage due to time and resource constraints. The dissemination stage was not carried out, as it requires a longer period of time for broad implementation and continuous evaluation.

1. Define

The first step taken before conducting the research was a needs analysis. The define stage consists of the following steps:

a. Front end Analysis

At this stage, interviews were conducted regarding the biology learning process at MAN Simalungun. An interview sheet was used to identify the needs of biology learning in the school. The results revealed that the learning process still relied on textbooks, the teaching method used by the teacher was predominantly lecture-based, students depended heavily on the teacher to obtain learning materials, and the biology content had not yet been integrated with spiritual or Islamic values.

b. Learner Analysis

This stage was carried out to gain insight into students' abilities. Based on the needs analysis questionnaire, it was found that students preferred biology learning to be presented in an engaging and varied way. The results also showed that students supported the development of TikTok-based biology learning media on the digestive system material integrated with *Wahdatul Ulum*.

c. Concept Analysis

At this stage, the development of TikTok-based videos was arranged systematically, and the basic skills required for understanding the material were identified. The analysis determined that the digestive system would serve as the primary material.

d. Task Analysis

This stage involved identifying appropriate learning tasks that would enhance students' basic competencies, such as observing, analyzing, and solving problems related to the digestive system.

e. Learning Objective Analysis

The learning objectives were derived from the analysis of learning outcomes. In the TikTok-based video, the intended objectives are: 1) Through video-viewing activities, students are able to correctly identify nutrients contained in daily food consumption. 2) Through literacy activities, students are able to correctly measure BMI and BMR based on their daily food intake. 3) Through video-viewing activities, students are able to correctly describe the structure of the human digestive system. 4) Through discussion activities after watching the video, students are able to correctly analyze the functions of human digestive organs. 5) Through video-viewing and literacy activities, students are able to correctly analyze the bioprocesses occurring in digestive organs. 6) Through video-viewing and discussion activities, students are able to correctly relate nutrition to dysfunctions in the human digestive system.

2. Design

In the design stage, TikTok-based video media was selected as the tool for delivering the learning material. Its advantage lies in the combination of audio and dynamic visuals, which can enhance students' interest and understanding of the human digestive system. The videos were designed using Canva, exported in MP4 format, and published on TikTok. Each video was designed in a 1920x1080 pixel landscape layout, featuring illustrations of digestive organs, food components, BMI and BMR calculations, as well as relevant Qur'anic verses and Hadith quotations.

3. Develop

The product development was carried out in two phases: the initial design before validation, and the revised design following expert feedback. The validation process was conducted to identify the strengths and weaknesses of the product in order to produce a higher-quality learning medium. The product was validated by a media expert, a subject matter expert, and a *Wahdatul Ulum* expert.

Table 5. Validation Results of Media

Aspects Assessed	Assessment Score	Maximum Score	Percentage
a. Visual Aspect	24	25	**96**
b. Audio Aspect	14	15	**93,3**
c. Typography Aspect	10	10	**100**
d. Material Content Aspect	20	20	**100**
e. Linguistic Aspect	20	20	**100**
f. Presentation Aspect	24	25	**96**
Total Score	112	115	**97,3**
Average Percentage		97,3	
Category		**Highly Valid**	

Based on the findings of this study, the validation process involved one revision. Some comments from the media expert included the need for an introduction and learning objectives, ensuring that all content presentations had appropriate reference sources, and changing the character symbol in the third video to a version with a hijab wearing human figure. After receiving feedback from the validator, the researcher made revisions to improve the video and optimize its appearance. According to the media expert validation, which assessed five aspects: visual, audio, typography, content, language, and presentation, the learning media in the form of a video achieved a validity score of 97.3%, which falls into the "Highly Valid" category.

The validator stated that the instructional media is deemed appropriate for use, as its components such as visual elements, audio, typography, content, language, and presentation adhere to sound principles of instructional design. The integration of text, images, and audio was assessed to effectively enhance students' comprehension. The dubbing voice in the video is exceptionally clear, appropriately aligned with the media, and closely related to both the content and the visuals presented. This aligns with previous research, which suggests that high-quality videos can support learning when the objectives are clear, text is legible, playback is smooth, and all media elements are well integrated (Ahdi et al., 2023).

Table 6. Results of Content Expert Validation

Aspects Assessed	Assessment Score	Maximum Score	Percentage
a. Content Aspect	34	35	**97,1**
b. Language Aspect	20	20	**100**
c Competency Aspect	10	10	**100**
d. Method Aspect	14	15	**93,3**
Total Score	78	80	**97,5**
Average Percentage		**97,5**	
Category		**Highly Valid**	

Based on the validator's observations, several suggestions were provided for the improvement of the learning media. Some of the feedback from the validators included recommendations for refining the terminology used in the digestive process. After receiving the input from the validators, the researcher made revisions to refine the content of the video to ensure better alignment. Based on the content expert validation, which covered four aspects: content, language, competence, and method, the media achieved a score of 97.5%, which falls into the "Very Valid" category. This aligns with previous research by Pilori et al., (2023),, which emphasized that content validation is an essential step that must be undertaken.

Materials that received high validation scores generally met academic, pedagogical, and relevance criteria. The content was considered valid by the validator as it aligned with instructional objectives and fulfilled four key aspects of validation: content accuracy, language use, competency alignment, and methodological appropriateness. As stated by Putri (2023), the high scores indicate that TikTok-based materials effectively deliver biology content in accordance with curriculum standards. Therefore, this media is not only visually appropriate but also contains strong instructional substance to support biology learning at the senior high school level.

Table 7. Results of Wahdatul Ulum Expert Validation

Aspects Assessed	Assessment Score	Maximum Score	Percentage
a. Aspect of Quranic Verse Relevance	17	20	**85**
b. Aspect of Content Presentation	13	15	**86,6**
c. Aspect of Contextual Truth	9	10	**90**
Total Score	39	45	**86,6**
Average Percentage		**86,6**	
Category		**Highly Valid**	

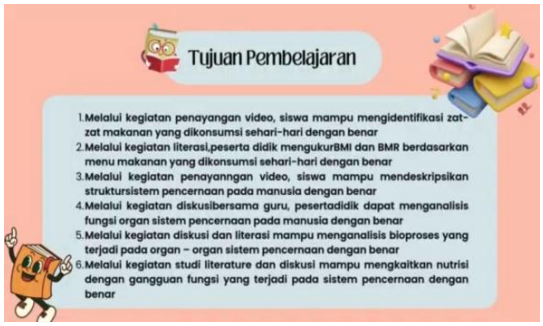
Based on the validation conducted by a *Wahdatul Ulum* expert, which encompassed three aspects—namely the relevance of Qur'anic verses, content presentation, and contextual essence the developed media received a score of 86.6%, falling into the "Highly Valid" category. The validator assessed that the selected Qur'anic verses were appropriate and contextually relevant in connecting the biological process of digestion with the greatness of Allah's creation. Overall, the digestive system material developed through TikTok-based media is integratively valid in terms of *Wahdatul Ulum.* All three components Qur'anic alignment, material presentation, and contextual relevance were adequately addressed. Thus, this media is deemed suitable for use in biology learning as it effectively embeds Islamic values in an integrated manner, rather than separating them from the scientific content delivered.

This approach is in line with the study conducted by Fatonah (2023), which supports the theory of curriculum integration within the *wahdatul ulum* framework, combining religious values and general scientific knowledge. The study received high validation scores, indicating that the integration of religious values was not merely symbolic but substantively embedded at both the content and visual levels. This aligns with the research by Sari & Adlini (2024), which emphasizes that wahdatul ulum validation reinforces the strong connection between biology learning and Islamic values, as it discusses the greatness of Allah SWT's creation.

This finding supports the notion that a high level of validity in the aspects of media design, instructional content, and Islamic values within TikTok-based learning does not merely indicate technical compliance with contemporary design standards, but also demonstrates pedagogical effectiveness in enhancing student learning outcomes. Such results reflect a comprehensive integration of visual and instructional quality with spiritual and moral dimensions, aligning with modern instructional design theories that emphasize learner

engagement and cognitive efficiency, as well as the *wahdatul ulum* approach, which advocates for the inseparable unity between scientific knowledge and Islamic worldview in educational practices.

Table 8. Revisions of the Development of TikTok-Based Biology Learning Video on Digestive System Material Integrated with Wahdatul Ulum

Design Results (Before Revision)	**Design Results (After Revision)**
(1)	**(2)**
	
No learning objectives were included	Learning objectives and goals were included to guide the learning process effectively
Character depicted as an ice cream	Character changed to a hijab-wearing woman to align with Islamic values
The definition of bile reflux was not described	The definition of bile reflux was clearly described
There was a wrong word: "menjaga pola akan"	The incorrect word was corrected to “menjaga pola makan”

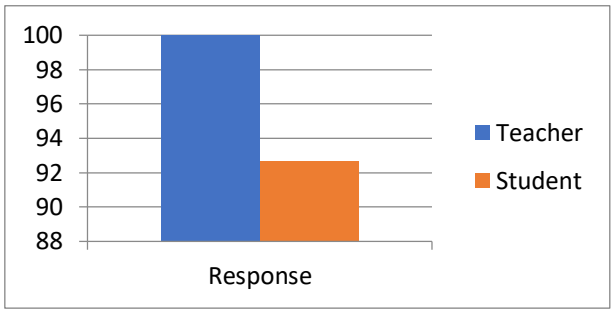


Figure 2. Practicality Test

Table 9. Practicality Test Results

Respondent	Number of Items	Score	Percentage
Teacher	10	100	**100%**
Students	10	1298	**92,7%**
Criteria			**Very Practical**

The results from the biology teacher's questionnaire indicated that the media was overall very practical**,** with a score of 100% (Table 9). Similarly, the response from Grade XI Science 1 students showed a very practical rating as well, with a score of 92.7% (Table 9). The media was considered easy to use, efficient, and supportive of the learning process. Teachers felt that the media assisted them in delivering lessons, while students found it engaging, easy to understand, and helpful for independent learning. Therefore, the media is deemed practical and suitable for classroom use.

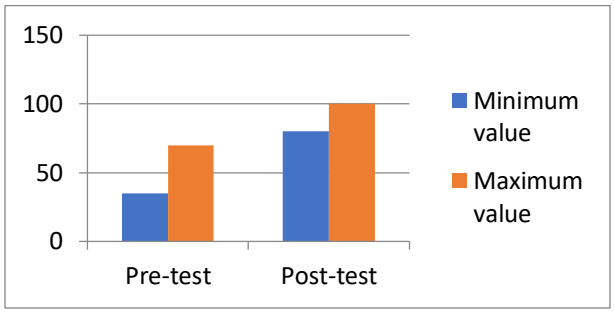


Figure 3. Effectiveness Test

Table 10. Effectiveness Test Results

Average Pre-test	Average Post-test	Pre-test - Post-test Difference	Ideal Score-Pre-test	N-Gain Score	N-Gain Percentage	Category
	53,92	90,53	36,06	0,7946	79,46	**Effective**

The effectiveness of the product was evaluated based on the results of pre-test and post-test administered to students. The pre-test, taken by 28 students of Grade XI Science at MAN Simalungun, yielded an average score of 53.92. After using the developed learning media, the students completed a post-test, resulting in an increased average score of 90.53. This indicates a significant improvement in students' learning outcomes. Based on these data, the normalized gain score (N-Gain) was calculated to be 0.79, which falls into the high category, indicating that the TikTok-based biology learning media is highly effective in improving students' understanding of the digestive system material integrated with *Wahdatul Ulum* values.

This study has limitations in terms of scope and the number of subjects, as it only involved 28 students from a single school, MAN Simalungun. Therefore, the findings cannot be widely generalized to other madrasah student populations, either in different regions or with more diverse characteristics. It is important to note the

limited focus of this research so that readers understand that the findings related to the validity, practicality, and effectiveness of TikTok-based learning media remain contextual.

This success can be attributed to the characteristics of the TikTok-based video learning media, which combines moving images, music, narration, and text—making it well-suited for students with visual-auditory learning styles. A study by Muhaimin et al., (2024), states that TikTok videos, when used as a supplementary learning medium, can facilitate comprehension by employing a format that supports multimedia learning principles. The integration of text, audio, and visual elements within the videos aligns well with visual and auditory learning styles, making the content more accessible and engaging for students. The dynamic video format captures students' attention and sustains their interest during the learning process. Additionally, the language used in the videos is simple, and scientific terms are explained clearly, helping students better understand biological concepts. An example is the term *"reflux empedu,"* which has been clearly explained within the instructional media and presented in Table 8. In the context of biology education, TikTok-based instructional videos serve as an effective learning tool by presenting content through engaging animations, audio narration, and easily understandable text. This multimodal approach contributes significantly to improving students' learning outcomes.

The findings of this study align with the results of research conducted by Maharani et al., (2020),which demonstrated that the use of TikTok-based video as a learning medium for the topic of substances and their changes significantly improved student learning outcomes. Additionally, Khairunnisa (2023) developed TikTok-based instructional media on the topic of the structure and function of animal tissues, and through pre-test and post-test assessments, obtained a score improvement percentage of 87.7%. These supporting studies reinforce the notion that TikTok-based learning media can enhance student learning outcomes.

The results of the analysis indicate that the TikTok-based instructional video developed in this study is feasible to be used as an educational product. This media has proven effective in improving both student achievement and interest in the digestive system material, as evidenced by the increase in post-test scores and the enthusiastic engagement of students throughout the learning process.

4. CONCLUSION

Based on the results of this study, it can be concluded that the biology learning media based on TikTok, focusing on the digestive system material integrated with *wahdatul ulum*, has been proven to be valid, practical, and effective in supporting learning. This feasibility is supported by the very high validity scores, with 97.3% for the media aspect, 97.5% for the content aspect, and 86.6% for wahdatul ulum. In terms of practicality, the media was rated as highly practical by students (97.2%) and teachers (100%). Moreover, this media has also been shown to be effective, evidenced by the significant improvement in students' learning outcomes, with an average pretest score of 53.93 increasing to a posttest score of 90.53, yielding an N-Gain value of 0.79 which is considered high. This success demonstrates an improvement in the quality of learning and is expected to serve as an engaging and relevant teaching material alternative that can be adapted by teachers in various educational institutions. However, the limitation of this study lies in the development phase, which was only completed up to the "Develop" stage, meaning that widespread implementation has not yet been carried out. Therefore, further research is needed to test the "Disseminate" phase and expand the development of TikTok-based biology learning media on digestive system material integrated with wahdatul ulum in other contexts.

5. ACKNOWLEDGEMENT

The author would like to express sincere gratitude to Mrs. Rohani, S.Ag., M.Pd., as the academic advisor; Mrs. Efrida Pima Sari Tambunan, M.Pd., as the examiner; Dr. Mhd. Rafi'i Ma'arif Tarigan, M.Pd., as the media validator; Mrs. Rasyidah, M.Pd., as the content validator; and Dr. Sapri, S.Ag., M.A., as the wahdatul ulum validator, for their valuable suggestions and constructive feedback regarding the feasibility of the media. The author also extends heartfelt thanks to all teachers, students, school staff, and fellow colleagues for their continuous support and encouragement throughout the course of this research.

6. REFERENCES

Afifah, A. N. (2023). Penggunaan Aplikasi Tiktok Sebagai Media Pembelajaran Untuk Mengembangkan Motorik Kasar Anak Usia 5-6 Tahun Di RA Al Amanah Tanjung Senang. In *Universitas Islam Negeri Raden Intan Lampung*. https://repository.radenintan.ac.id/29473/

Agustini, P. V., & Meliyawati. (2022). Peran Media Pembelajaran Berbasis Teknologi Informasi Dan Komunikasi Di Era Pandemi Covid-19. *Aksara: Jurnal Ilmu Pendidikan Nonformal*, *8*(1), 147. https://doi.org/10.37905/aksara.8.1.147-154.2022

Ahdi, M. F. A., Wahjoedi, & Peby, G. (2023). Pengembangan Media Pembelajaran Berbasis Tiktok Pada Pembelajaran PJOK Materi Narkoba pada Peserta Didik Kelas X MAN Karangasem. *Jurnal Pendidikan*

Jasmani, Olahraga Dan Kesehatan, *10*(3), 103–112. https://doi.org/10.23887/jjp.v10i3.58886

Amalia, A. D., Rofi, S., & Makrifah, I. A. (2024). Development of Content Video Tiktok as a Learning Media to Teach Speaking Skill for Students in SMK Islam 1 Blitar. *Journal of English Development*, *4*(22), 409–424. https://journal.iaimnumetrolampung.ac.id/index.php/jed%0ADevelopment

Anngie, A. P. (2023). Pengembangan Media Pembelajaran Video Berbasis Aplikasi TikTok Untuk Siswa SMA Kelas XI Pada Materi Sistem Peredaran Darah. In *Universitas Jambi*. https://repository.unja.ac.id/59989/

Asih, L. K., Atikah, C., & Nulhakim, L. (2023). Pengembangan Media Pembelajaran Video Animasi Berbasis Animaker Untuk Meningkatkan Hasil Belajar Siswa SD. *Jurnal Ilmiah Pendidikan Citra Bakti*, *10*(2), 386–400. https://doi.org/10.38048/jipcb.v10i2.1634

Asrofunnisa, K., & Hakim, N. (2024). Pengembangan Modul Elektronik Terintegrasi Nilai Keislaman Pada Materi Virus untuk Kelas X SMA/MA. *Biodik*, *10*(1), 43–53. https://doi.org/10.22437/biodik.v10i1.30908

Azizah, S., Sari, R. P., & Hasby. (2023). Pengembangan Media Pembelajaran Berbasis TikTok Pada Materi Kesetimbangan Kimia. *Jurnal Penelitian Kimia Dan Pendidikan Kimia Vol.*, *6*(1), 39–49. https://ejurnalunsam.id/index.php/katalis/article/view/7914

Berutu, A. I., Mafira, R., & Riki, N. H. (2024). Peran Guru Dalam Menggunakan Media Pembelajaran Interaktif Untuk Membangun Motivasi dan Minat Belajar Siswa. *Inspirasi Dunia: Jurnal Riset Pendidikan Dan Bahasa*, *3*(3), 88–97. https://doi.org/10.58192/insdun.v3i3.2249

Bohang, F. K., & Reza, W. (2018). Tik Tok Punya 10 Juta Pengguna Aktif di Indonesia. *Kompas. Com.* https://tekno.kompas.com/read/2018/07/05/09531027/tik-tok-punya-10-juta-pengguna-aktif-di-indonesia

Cholil, A. F. (2019). Pengaruh Globalisasi dan Era Disrupsi terhadap Pendidikan dan Nilai-Nilai Keislaman. *Sukma: Jurnal Pendidikan*, *3*(1), 117–136. https://doi.org/10.32533/03106.2019

Faeha, A., Wahid, A., & Udaibah, W. (2019). Pengembangan Bahan Ajar Kimia Berbasis Integrasi Islam-Sains Materi Minyak Bumi Sebagai Implementasi Pendidikan Karaekter. *Journal of Education Chemistry*, *1*(15–21). https://journal.walisongo.ac.id/index.php/jec/article/view/3937

Fatonah, S. (2023). *Pengembangan Media Pembelajaran Berbasis Aplikasi TikTok dengan Nilai-Nilai Keislaman pada Materi Sistem Reproduksi Kelas XI SMA/MA* [IAIN KUDUS]. http://repository.iainkudus.ac.id/10726/

Febriyana, E. (2023). *Pengembangan Media Pembelajarn Edukatif Berbasis Media Sosial TikTok Pada Materi Fungsi dan Unsur Warna CMYK dan RGB Untuk Siswa SMK TKJ*. Universitas Lampung. http://digilib.unila.ac.id/74882/

Fikri, H., & Madona, A. S. (2018). Pengembangan Media Pembelajaran Berbasis Multimedia Interaktif. In *SamudraBiru*.http://repo.bunghatta.ac.id/6983/1/Buku%20Pengembangan%20Media%20Pembelajaran%202018.pdf

Godin, V. V., & Terekhova, A. E. (2021). Digitalization of Education: Models and Methods. *International Journal of Technology*, *12*(7), 1518–1528. https://doi.org/10.14716/IJTECH.V12I7.5343

Herlisya, D., & Wiratno, P. (2022). Having Good Speaking English through Tik Tok Application. *Journal Corner of Education, Linguistics, and Literature*, *1*(3), 191–198. https://doi.org/10.54012/jcell.v1i3.35

Johan, J. R., Tuti, I., & Arris, M. (2023). Penerapan Model Four-D dalam Pengembangan Media Video Keterampilan Mengajar Kelompok Kecil dan Perorangan. *Jurnal Pendidikan West Science*, *01*(06), 372–378. https://wnj.westscience-press.com/index.php/jpdws/article/view/455

Julita, & Purnasari, P. D. (2022). Pemanfaatan Teknologi Sebagai Media Pembelajaran Dalam Pendidikan Era Digital. *Journal of Educational Learning and Innovation*, *2*(2), 227–239. https://doi.org/10.46229/elia.v2i2

Junaedi, M., & Wijaya, M. M. (2021). Islamic Education Development Based On Unity Of Sciences Paradigm. *Ulul Albab*, *22*(2), 292–312. https://e-journal.undikma.ac.id/index.php/prismasains/article/view/6595

Khairunnisa, S. (2023). *Pengembangan Media Pembelajaran Video Berbasis Aplikasi TIKTOK Pada Materi Struktur dan Fungsi Jaringan Hewan Untuk Siswaa SMA Kelas XI IPA*. https://doi.org/10.37905/inverted.v2i1.13081

Kolopita, C. P., Katili, M. R., & Yassin, R. M. T. (2022). Pengaruh Media Pembelajaran Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Komputer dan Jaringan Dasar. *Inverted: Journal of Information Technology Education*, *2*(1), 1–12. https://doi.org/10.37905/inverted.v2i1.13081

Lailiya, U. (2022). *Pengembangan Video Berbasis Aplikasi TikTok Pada Pembelajaran Teams Game Tounament Materi Sistem Reproduksi Untuk Meningkatkan Pemahaman Konsep Dan Motivasi Belajar Siswa MAN Temanggung*. Universitas Tidar. https://repositori.untidar.ac.id/index.php?p=fstream-pdf&fid=28866&bid=11772

Maharani, A. D., Ayatusa'adah, & Mukhlis, R. (2020). Pengembangan Video Animasi Pembelajaran Berbasis Aplikasi TikTok pada Materi Zat dan Perubahannya Pelajaran IPAS Kelas X SMK. *Jurnal Pendidikan MIPA*, *15*(2), 385–397. https://ejournal.tsb.ac.id/index.php/jpm/article/view/2611

Mardiah, A. A., Nasution, N. F., & Siregar, N. (2021). Analisis Kesulitan Belajar Siswa Pada Materi Sistem Pencernaan Manusia dalam Pembelajaran Daring di Kelas XI IPA SMA Negeri 1 Angkola Selatan. *Jurnal Edugenesis-Institut Pendidikan Tapanuli Selatan*, *3*(1), 13–22. http://download.garuda.kemdikbud.go.id/article.php?article=3250061&val=28507

Muh. Umran, L. O., La Ode Herman, La Iba, Joko, Rajab, M., & Rasyid, M. R. R. (2023). Pemanfaatan Media Tiktok sebagai Sarana Proses Pembelajaran pada Siswa Menengah Pertama Negeri 11 Kendari. *Kongga : Jurnal Pengabdian Masyarakat*, *1*(2), 61–66. https://doi.org/10.52423/kongga.v1i2.17

Muhaimin, A., Wahid, A., & Jenuwa, N. (2024). Student ' s Perspective on Implementing TikTok as Supplementary Teaching and Learning Activity in Higher Education : A Preliminary Study. *Journal of Computing Research and Innovation*, *9*(2). https://doi.org/10.24191/jcrinn.v9i2.480

Muhammad, I., Mukhibin, A., Naser, A. D. muhamad, & Dasari, D. (2023). Bibliometric Analysis: Research Trend of Interactive Learning Media in Mathematics Learning in Indonesia. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *11*(1), 10. https://doi.org/10.33394/j-ps.v11i1.6595

Nasution, I. W. J. P., Siregar, T. A. P., Ritonga, A. A., & Al Farabi, M. (2024). Pendidikan Wahdatul 'Ulum Dalm Al Qur'an. *Mimbar Kampus: Jurnal Pendidikan Dan Agama Islam*, *23*(2), 927–940. https://doi.org/10.17467/mk.v23i2.1524

Pandar, M., & Sahid, M. (2024). Pengaruh Media Pembelajaran Tik Tok Terhadap Keaktifan Siswa Kelas VII Pada Mata Pelajaran PPKN. *Jurnal Dedikasi Pendidikan*, *8*(2), 917–928. http://jurnal.abulyatama.ac.id/index.php/dedikasi/article/view/4928

Pilori, R., Eng, S. M., & Daud, Y. (2023). Pengembangan Media Tiktok Pada Mata Pelajaran Geografi Pada Materi Dinamika Litosfer Dan Dampaknya Terhadap Kehidupan Di Kelas X Sma Negeri 1 Gorontalo. *Edu Geography*, *11*(6), 57–66. https://journal.unnes.ac.id/sju/edugeo/article/view/74607

Pranoto, I., & Agraini, E. (2021). Aplikasi Tik Tok: Pengembangan Media Pembelajaran Perkuliahan Desain Dwimatra Prodi Sendratasik Universitas Palangka Raya. *Jurnal Pendidikan Ilmu Pengetahuan Sosial (JPIPS)*, *2021*(13), 11–11. http://e-journal.upr.ac.id/index.php/JP-IPS

Putri, N. (2023). Penggunaan Media Aplikasi TikTok dalam Pembelajaran Keterampilan Menulis Narasi Siswa Kelas VII MTs Al-Falah Jakarta Selatan Tahun Pelajaran 2022/2023. In *Repository.Uinjkt.Ac.Id*. https://repository.uinjkt.ac.id/dspace/handle/123456789/75241%0Ahttps://repository.uinjkt.ac.id/dspace/bitstream/123456789/75241/1/11180130000081_NABILA PUTRI_SKRIPSI.pdf

Rizki, Arif, A., & Wati, S. (2019). Integrasi Ilmu Pengetahuan Umum dan Agama dalam Kurikulum Pendidikan

Agama Islam. *Jurnal Kurikulum Dan Pembelajaran*, *7*(1). https://e-journal.iainsalatiga.ac.id/index.php/blockediain345/article/viewFile/2268/1080

Rukhmana, T., Mulyapradana, A., Baruno, Y, H. E., Karsim, Franchitika, R., & Ikhlas, A. (2024). Pentingnya Pendidikan Karakter di Era Digital Untuk Masa Depan Siswa Sekolah Dasar. *Journal On Education*, *06*(03), 15795–15800. https://jonedu.org/index.php/joe/article/download/5458/4363/

Samitra, D., & Harmoko. (2021). Uji Valifasi Dan Kepraktisan Lembar Kerja Mahasiswa Berbasis Keterampilan Proses Sains. *Jurnal Pendidikan Biologi Dan Sains*, *4*(2), 146–154. https://journal.ipm2kpe.or.id/index.php/BIOEDUSAINS/article/view/2500

Sari, S. M., & Adlini, M. N. (2024). E-majalah biologi terintegrasi wahdatul ulum : Media pembelajaran pada materi sistem reproduksi Jurnal Biologi-Inovasi Pendidikan. *Jurnal Biologi Inovasi Pendidikan*, *6*(2), 137–146. https://ppjp.ulm.ac.id/journal/index.php/bino/article/view/19162

Sugiyono. (2019). *Metode Penelitian dan Pengembangan (Research and Developennt)*. Alfabeta.

Wafi, R. H., & Yanuar, Y. P. (2023). Aplikasi TikTok sebagai Media Sumber Belajar oleh Siswa Kelas 12 SMA Islam Al Azhar 14 Semarang. *Jurnal Ilmu Perpustakaan*, *12*(1), 49–63. https://ejournal3.undip.ac.id/index.php/jip/article/view/38262

Wibowo, B. P., & Wahyu, D. K. (2024). Pengembangan Media Pembelajaran Berbasis TikTok Untuk Menunjang Mata Pelajaran Kommpetensi Kelistrikan Teknik Kendaraan Ringan Siswa Kelas XI Di SMKN 1 Jabon. *Jurnal Desgrafia*, *13*(3), 1–8. https://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-teknik-mesin/article/view/65016/49025

Widodo, B. J., & Hanifah, B. A. (2020). Pengembangan Media Monopoli Aksara Jawa Untuk Pembelajaran Membaca Aksara Jawa di Sekolah Dasar. *Jurnal Kontekstual*, *1*(2), 19–28. https://jurnal.umus.ac.id/index.php/kontekstual/article/view/158

Wulandari, A. P., Annisa, A. S., Krina, C., Tsani, S., Nurazizah, & Zakiah, U. (2023). Pentingnya Media Pembelajaran dalam Proses Belajar Mengajar. *Journal on Education*, *5*(2), 3928–3936. https://doi.org/10.31004/joe.v5i2.1074

Zahirah, T. (2021). Pengembangan Media Pembelajaran Biologi Berbasis TIK TOK Pada Materi Sistem Ekskresi Kelas XI Di MAN 1 Langsa. https://repository.ar-raniry.ac.id/id/eprint/19494/