

DEVELOPMENT OF LEARNING VIDEOS ASSISTED BY INSTAGRAM MEDIA ON THE REACTION RATE CONTENT

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Abstract. Chemistry is the study of matter and the changes it undergoes. Chemical matter is defined as anything that has mass and occupies space. Based on interviews with a teacher at SMAN 7 Pontianak, it was revealed that students have difficulty learning reaction rates, especially in understanding the concept of reaction rates. Students can only repeat the definition of reaction rates without truly understanding their meaning, leading them to rely solely on memorization. The abstract nature of reaction rate material is also one of the reasons why students have difficulty learning this topic. The purpose of this research is to develop Instagram-based learning videos on the topic of reaction rates and to determine the validity and student response to these learning videos in an effort to increase efficient and effective knowledge. This research uses the Research and Development (R&D) approach with the ADDIE (*Analyze, Design, Develop, Implement, Evaluate*) model, applied only to the Analyze, Design, and Develop stages. The data collection techniques used were direct communication techniques (interviews) and indirect communication (validity test questionnaires and student response questionnaires). The research instruments were in the form of a feasibility assessment sheet and a student response questionnaire. The research results prove that the average percentage of content validity is 95.9%, and media validity is 98%, both with very valid criteria. The average percentage of student responses in the small group test reached 83.3% with very good criteria, while in the large group test it was 91.25%. In addition, the average percentage of teacher responses reached 88%, with very good criteria. Therefore, it can be concluded that the Instagram-based learning video on the topic of reaction rates is declared very suitable for use.

Keywords: reaction rate, development, learning videos

INTRODUCTION

Chemistry is the study of matter and the changes it undergoes. Chemical matter is defined as anything that has mass and occupies space. Chemical matter can be a single substance (element) or a mixture (compound) (Yuliana et al., 2023). One of the topics studied in chemistry is reaction rate. Reaction rate is one of the chemistry learning materials for 11th grade high school/equivalent, found in Basic Competencies 3.6 and 4.6 in the high school/equivalent subject syllabus by the Ministry of Education and Culture. Based on interviews with a teacher at SMAN 7, Pontianak, it was revealed that students have difficulty learning reaction rates, especially in understanding the concept of reaction rates. Students can only repeat the definition of reaction rates without truly understanding their meaning, leading them to rely solely on memorization. The abstract nature of reaction rate material is also one of the reasons why students find it difficult to learn reaction rate material. Some teachers also revealed that online learning was implemented as a result of the COVID-19 pandemic, which caused difficulties in effectively providing materials to students

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(Putri & Muhtadi, 2018). One of the main impacts is the limitation of direct interaction between teachers and students, which hinders a more effective learning process.

Students who are still struggling to learn the material on reaction rates have lower learning outcomes. There are several factors that can influence learning outcomes, namely teacher competence, the curriculum system, the learning media used in the learning process, and the research strategies and methods employed (Putri & Muhtadi, 2018). A monotonous learning process that only uses media like *PowerPoint* and focuses solely on student worksheets, preventing students from optimally understanding the material (Ngenda et al., 2021). In addition, the COVID-19 pandemic, which necessitated online learning, has affected students' interest in learning. Online learning makes the learning process boring and suboptimal, leading to a decline in students' learning outcomes (Iriani, 2010). Teachers find it more difficult to explain the three levels of chemical representation in an online learning environment. As a result, it will be challenging for students to understand subsequent material, such as chemical equilibrium, solution chemistry, thermodynamics, reaction rates, electrochemistry, acids and bases, molecular structure, and chemical reactions. One solution that can minimize this gap is by providing appropriate learning media.

Learning media is defined as a communication tool for effectively presenting learning information from various sources to students, thus creating a conducive learning environment (Mayasari et al., 2021). The use of adequate learning media in schools has the potential to increase students' learning independence, which in turn helps achieve learning objectives more optimally (Miftah, 2013). With the appropriate use of media, students will understand the learning material more easily and actively participate.

The use of the internet and multimedia technology has changed the way knowledge is delivered, offering an alternative presentation of learning that takes place outside the classroom and can be accessed anytime, anywhere. One platform that is easily accessible, free, and can be utilized as an alternative learning medium is social media. One of the most popular social media platforms right now is Instagram. Instagram is considered an application that the majority of Indonesians enjoy. Instagram offers many features that make users addicted to using it. Beside being used for sharing selfie photos, Instagram has also become a source of the latest information on various topics, such as education, work, tutorials, and current trending news (Supratman, 2018). The constantly evolving features make Instagram a platform that is not only for seeking information but also for entertainment.

Given the high usage of the Instagram social media platform among students, this prompted the author to consider it as an alternative learning medium. Instagram, as one of the platforms with a large number of users, offers significant potential for application in the educational context. According to Rohima (2023), learning media is defined as anything useful in presenting information to the recipient, with the goal of stimulating students' ideas, thoughts, and interest in learning. Therefore, Instagram, with its diverse interactive features, has the potential to support the creation of a more engaging and effective learning environment, as well as increase student activity and motivation.

Pramono (2022) explains that video learning media is defined as a tool that combines visual and audio elements to present various learning messages. This will increase the motivation and enthusiasm of the students. This means that learning videos function as a tool for conveying information and creating effective and engaging learning experiences (Yendrita & Syafitri, 2019). Based on the background above, the objectives of this research are to produce a learning video product based

on Instagram media for reaction rate material, assess its validity level, and determine the responses of students and teachers.

METHOD

The type of research used is research and development, which aims to develop learning models and products (Sugiyono, 2013). This ADDIE research is limited to three stages: Analysis, Design, and Development, with the aim of determining feasibility and measuring response. This restriction is implemented to expedite the development process and focus on content creation (Nukila et al., 2022). The research and development procedure is shown in Figure 1.

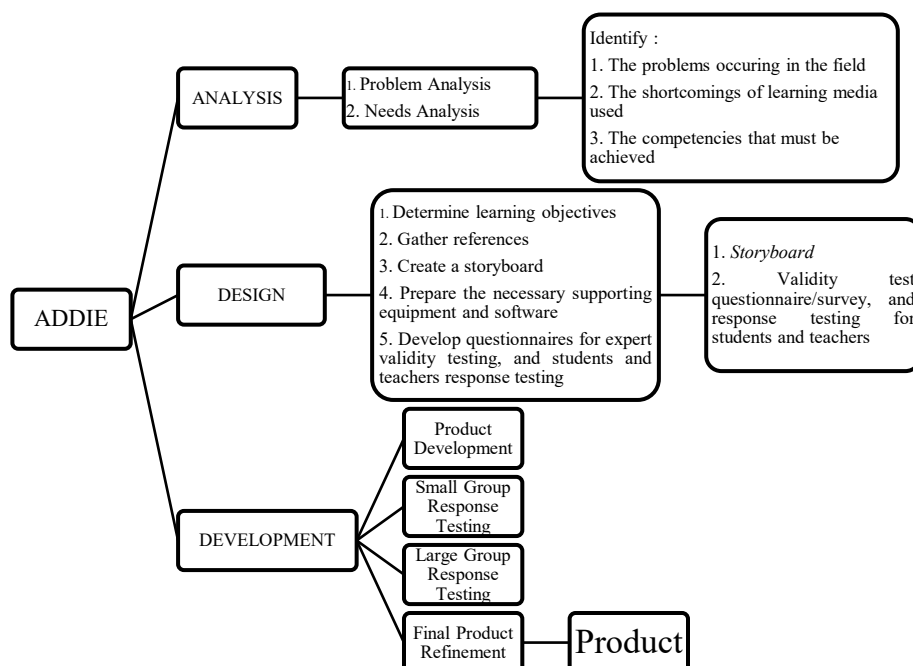


Figure 1. Research and development procedure

The research subject is Instagram-based media learning videos. The validation process involves three media experts and three content experts. Language validity was not performed because there were some non-standard sentences, but there was an assessment item for the language aspect in the media validation. The subjects of this study were 53 12th-grade science students at SMAN 7 Pontianak. The data collection techniques used were direct communication techniques (interviews) and indirect communication techniques (validity test questionnaires and student response test questionnaires). Validation was carried out by six experts, consisting of three content experts and three media experts. The aspects to be measured from the material validation are: the suitability of the material with learning objectives, the ability aspect, and the accuracy of the material to foster curiosity. Additionally, there are three media expert validators. The aspects to be measured are video quality, audio quality, text quality, language, convenience, and usefulness. This process aims to assess the extent to which the educational video meets the necessary pedagogical and technical standards. According to research conducted by Febrianti et al (2021), the use

of material validation questionnaires, media validation questionnaires, and student and teacher response test questionnaires resulted in a coefficient value of 1 for each of these questionnaires. A coefficient value of 1 proves that all elements tested, both in terms of content and media, have met the validation criteria very well. Thus, it can be concluded that the Instagram-assisted learning media developed in this study is suitable for use in supporting the learning of reaction rate material, as it has been proven effective and meets existing learning needs.

In the student and teacher response test, there are 3 aspects: attractiveness, convenience, and understandability.

In this study, the measurement scale for the validity level of the questionnaire utilizes the *Likert* scale as shown in Table 1 below.

Table 1. Score provisions on the *Likert* Scale

Statement	Score
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

Source/reference: (Sugiyono,2016).

The data processing of the validation results from video learning experts, content experts, and media experts was carried out using the formula:

$$V - ah = \frac{Tse}{Tsh} \times 100\% \dots\dots\dots(1)$$

Description:

V-ah : Expert validator

Tse : Total empirical score of the validator

TSh : Highest score

The resulting figures/outcomes are then interpreted by looking at the validity conversion from the following table 2.

Table 2. Conversion of validity percentage

Achievement Criteria%	Validity Criteria	Explanation
01,00 – 50,00 %	Invalid	Not usable
50,01 – 70,00 %	Less Valid	Not usable because major revisions are needed
70,01 – 85,00 %	Valid	Usable with minor revisions
85,01 – 100 %	Highly Valid	Usable without corrections

Source/reference: (Akbar,2013)

Data analysis from the results of the learning video response test was conducted using the developed (Akbar, 2013) and modified adaptation formula. The calculation formula for evaluating audience (student) response is as follows:

$$V - a = \frac{Tse}{Tsh} \times 100\% \dots\dots\dots(2)$$

Description :

V-ah : Audience validity

Tse : Total empirical score
 TSh : Highest score

The results of the data analysis of student response tests to Instagram-assisted learning videos were determined based on the criteria reviewed in Table 3 below:

Table 3. Percentage and criteria for response test

Achievement Criteria %	Qualification
85,01-100 %	Very Good
70,01-85,00 %	Good
50,01-70,00 %	Fair
01,00-50,00 %	Poor

Source/reference: (Akbar,2013)

RESULT AND DISCUSSION

Analysis

The first stage is analysis, which aims to identify potential performance gaps through problem analysis and needs analysis. Based on interviews with one of the chemistry teachers at SMAN 7 Pontianak, it was found that students are facing difficulties in understanding the material on reaction rates. The main obstacle identified is the limited available learning time, which is insufficient to cover the material in depth. Additionally, in practice, teachers still rely on classical teaching methods, namely lectures, where students only write down what they hear and what the teacher explains without active interaction or student involvement in the learning process. This contributes to boredom among students, creating a passive learning environment and reducing learning effectiveness.

Another problem is that the learning media used by teachers is limited to PowerPoint and textbooks. This is considered less capable of maximizing student engagement. The teacher also revealed that the development of learning media is still limited. Therefore, to enhance students' understanding of the concept of reaction rate, more innovative and easily accessible learning media are needed, such as learning videos that can be accessed anytime, anywhere. The use of such interactive media is expected to stimulate teachers' creativity in designing more engaging and innovative learning, as well as increase students' motivation and involvement in the learning process (Melati et al., 2023).

Design

The second stage is design, which includes a series of structured steps to produce effective and innovative educational videos. At this stage, the first step is to clearly define the learning objectives, which serve as the foundation for creating video content. Then, reference sources were collected from digital platforms such as YouTube and Instagram to obtain relevant ideas and materials related to the topic of reaction rates. Next, a storyboard was created to design the video flow and visualize how the material would be presented. At this stage, the text narrative that will be used in the video is also compiled to ensure clear and structured material delivery. After that, preparations for supporting software were made, including Adobe Illustrator and Canva, which were used to design the necessary graphic elements. In Canva, various design assets were combined, and a series of animated slides were created to present information visually appealingly. Once the design was complete, each animated slide was exported as a video file, and then edited using the paid application Adobe Premiere Pro version 22.2. In Adobe Premiere Pro, the animated slides were combined into a single video and accompanied by a soundtrack consisting of instrumental music

and voiceover. To ensure synchronization between the animation and narration, video segments were trimmed and rearranged (cut-to-cut). After the editing process is complete, the video is saved and rendered in the appropriate format, then exported in MP4 format for easy distribution and use. In addition to these reasons, the MP4 format can also store videos with good quality and has a relatively small file size compared to other video formats, making it easier to download and store. The next step is the creation of a validation test questionnaire by experts to ensure the quality and suitability of the material presented in the learning video. In addition, a test was conducted to assess students' responses to the video, in order to measure the extent to which the Instagram-assisted learning video could improve their understanding of reaction rates. This questionnaire is important for evaluating the effectiveness of the video in the context of learning, as well as for obtaining useful feedback for future improvements.

Each component of the reaction rate learning video product is arranged based on a storyboard design as a guide during the product creation process. This learning video is divided into three parts: introduction; video content, which includes the material to be discussed such as the definition of reaction rate; factors affecting reaction rate; reaction order, and example questions; and conclusion.

Develop

The third stage is the development phase of learning media, which involves the validation process of the product that has been created. In this stage, the designed learning video is tested for feasibility by experts to ensure the quality and suitability of the material and media used. Here is an image showing the content of the learning video.

Table 4. The Images of learning video content

No	Image	Description
1		In Figure 1, there is an image containing the opening of the learning video. At the 0.16-second mark, the opening content and the topic of reaction rate material are displayed.

No	Image	Description
2		Figure 2 shows the content of the learning video. Where, from minute 01:00 to minute 04:00, the content of reaction rates is presented, including factors that influence reaction rates.
3		In each discussion of reaction rate material, there are example questions and their solutions. And from minute 04:00 to 04:45, there are practice questions to measure students' understanding of reaction rate material.
4		The closing section of the video contains a summary and encouragement for the students.

Material Expert Validation

Suitability assessment of the material appearance aspect in Figure 5.

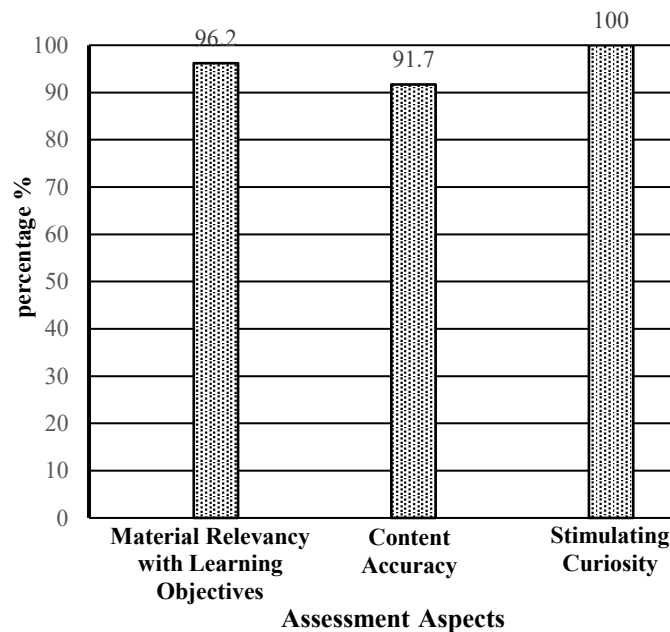


Figure 5. Material validation results n=3

Based on the results of the material validation shown in Figure 5, an average percentage of 95.9% was obtained. This proves that the reaction rate learning video developed using Instagram media is in accordance with the expected learning objectives, which include the ability to understand the concept of reaction rate material, student engagement, and students' critical thinking skills (Rahmawati et al., 2023).

Based on the validity results reflected in the diagram above, it can be concluded that the material used in the learning is considered highly relevant to the established learning objectives. This is reflected in the percentage obtained for the aspect of material suitability with learning objectives, where all three validators provided a very high level of agreement, amounting to 96.2%. This percentage proves that the material used meets the criteria of being highly valid in terms of its suitability with learning objectives. Effective learning media is anything useful in conveying a message, as well as stimulating the attention, thinking, and abilities of learners to support the learning process. Regarding the accuracy of the material, the results obtained show a percentage of 91.7%, which falls under the valid criteria. This proves that the material presented has a high level of accuracy, although there is still some room for improvement. Additionally, in terms of stimulating curiosity, the learning material received a percentage of 100%, indicating it is highly valid. This result indicates that the material presented was highly effective in stimulating the curiosity of the students, thus optimally supporting the learning process. Overall, these validity results prove that the materials used are highly effective in supporting learning objectives, with a high level of suitability, valid accuracy, and excellent ability to stimulate students' curiosity (Husna & Supriyadi, 2023).

Media Expert Validation

The next stage is media validation, which is intended to obtain data on the validity of the prototype based on aspects of video quality, audio quality, text quality, language, and convenience. The results of the media validation percentage are reviewed in Figure 6.

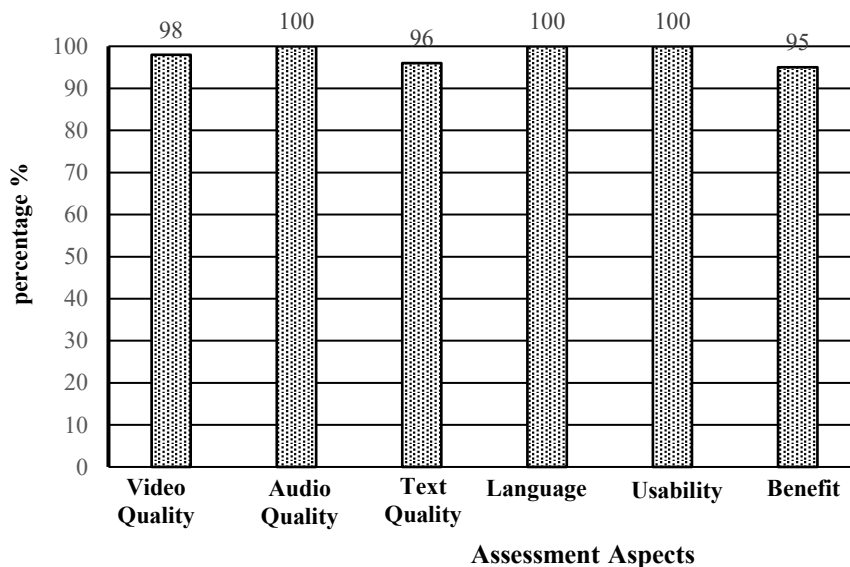


Figure 6. Media validation results n=3

Based on Figure 6, it shows that the media validity results obtained an average percentage of 98.2%. The video quality aspect received a percentage of 98%, indicating that the video meets very valid criteria. Optimal video quality, including image sharpness, clear color contrast, and audio clarity, is an essential element in learning media. Visually appealing and precise editing can enhance students' understanding of learning materials, such as the concept of reaction rate (IKA, 2021) (IKA, 2021). This finding indicates that all validators strongly agree that this video meets excellent quality standards.

The audio quality aspect received a score of 100%, indicating that the video is highly valid in terms of sound quality. No audio disturbances were found that could hinder students' understanding of the material presented. This result indicates that the video used is fully acceptable without the need for revisions to the audio portion, thus supporting an optimal learning experience for students.

The text quality aspect received a percentage of 96%, indicating that the text displayed in the video is highly valid and requires no further changes. This value shows that the text used in the video already meets the expected quality standards, contributing positively to students' understanding of the learning material.

The language aspect received a percentage of 100%, indicating that the language used in the video was very clear and easy for students to understand. The sentences used in the video tend to be simple and straightforward, making it easier for students to absorb information better (Fitri & Ardipal, 2021). Clarity in language use significantly impacts the effectiveness of video as a learning tool.

The usability aspect of the learning video obtained an average percentage of 100%, which means that all validators strongly agreed that the video was easily accessible and usable. Videos can be easily accessed by teachers and students through the Instagram platform, which increases the efficiency of distributing learning materials (Yudela et al., 2020). This high accessibility is one of the key factors in supporting the use of video-based learning media.

The benefit aspect received a percentage of 98%, indicating that this learning video is highly valid in providing flexibility to students. They can access learning videos anytime, anywhere, which allows them to improve their understanding and learning outcomes independently (Nugrahadi & Mamahit, 2022). Well-structured videos can help students clarify and understand the material presented by the teacher, thus positively impacting the quality of learning (Hayati et al., 2023).

To ensure the quality of educational videos, it is important to test the video's comprehensibility, convenience, and appeal. This aims to ensure that the video meets the eligibility criteria as a reliable learning resource in the learning process (Novera et al., 2022).

Students and Teachers Response Test Stage

The next stage in this research is the implementation of the response test for students and teachers. The response test was conducted in two stages at SMAN 7 Pontianak. The first stage was a small group response test, involving 18 students. The second stage was a large group response test, involving 53 students and 3 chemistry teachers. The small group response test aimed to identify potential errors in the media as assessed by the students. The number of participants in this small group response test ranged from 8 to 20 people. Meanwhile, the large group response test was intended to refine the resulting product so that it could be used optimally. This stage will serve as the foundation for product implementation in subsequent stages of the development process, utilizing the ADDIE model (Branch, 2009).

The results of this response test are presented in the following table.

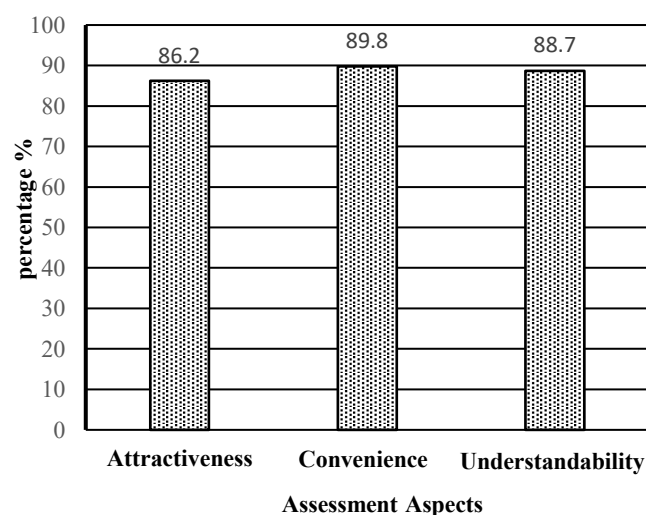


Figure 7. Small group response test results n=18

Based on the data shown in Figure 7, the results of the small group response test prove that the average validity percentage reaches 88.3%, which is categorized as highly valid. The students' responses prove that the learning video is considered interesting and can motivate them to understand the presented material. The use of learning media such as videos can increase students' interest, which in turn can foster learning motivation (Ikhsan et al., 2022). This learning video is equipped with interesting discourse, images, and videos, and is able to expand students' knowledge about examples of reaction rate concepts. Additionally, some practice questions are included to help students assess their understanding of the material. The use of this video is considered easy because it is equipped with usage instructions and can be accessed anytime, anywhere. Nevertheless, the attractiveness indicator has not reached 100%, due to the presence of colors considered less harmonious. The attractiveness of learning videos can be assessed from various aspects, such as media appearance, image and video suitability, concept relevance, and the way the material is presented (Diani & Hartati, 2018).

Next, a response test was conducted on a large group consisting of 60 students at SMAN 7 Pontianak, who were randomly selected. The results of the response test on this large group are reviewed in Figure 8.

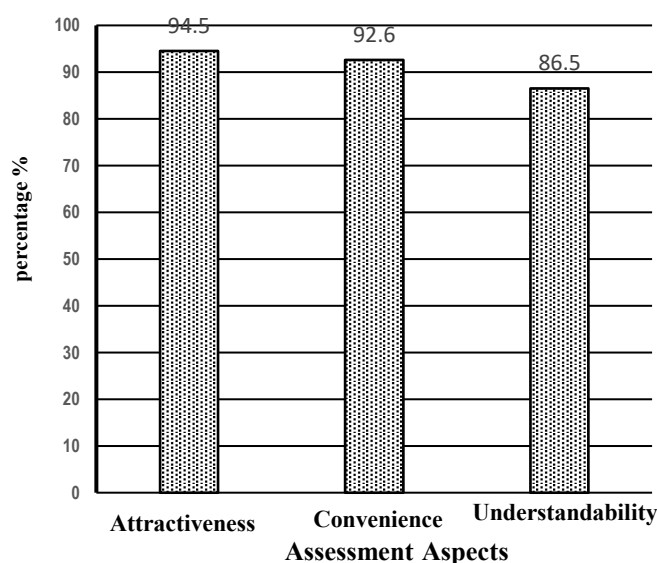


Figure 8. Large group response test results n=53

Based on Figure 8, the results obtained from the large group response test show an average percentage of 91.2%. This proves that the comprehensibility indicator has the lowest percentage, which is 86.5%, with a very feasible criterion. The attractiveness aspect has a percentage of 94.5%, with a very valid criterion. The convenience aspect has a percentage of 92.6%, with a very valid criterion.

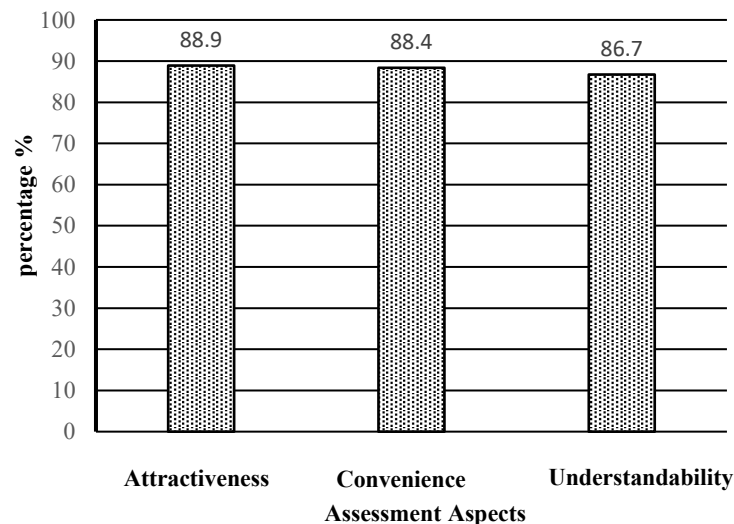


Figure 9. Teachers response test results guru n=3

The results obtained from teacher assessments yielded an average percentage of 88%. This indicates that every aspect of the response test stage received a very good response from the teachers.

Based on the student and teacher response results reviewed in diagrams 4, 5, and 6 above, with an average percentage of 88.3% for the small group test, 91.2% for the large group test, and 88% for teacher responses, it can be said that the developed learning video meets the excellent criteria for each response test based on the response tests that have been conducted. This indicates that the learning videos produced can be implemented as an alternative learning method. According to Sudaryono et al (2013), media is considered suitable for use in learning when it receives a very positive response in research.

The positive response from students and teachers indicates that this Instagram-based learning video on the topic of reaction rates is very engaging, and students find it very helpful in understanding the material presented in the video. The advantages of this learning video are that it facilitates interaction between teachers and students and allows for the delivery of material through the Instagram social media platform. The learning video is more engaging and can be accessed anytime, anywhere, providing students with new knowledge to study reaction rates using *online* learning media.

CONCLUSION

Based on the data obtained from the research and development conducted, it can be concluded that this research resulted in a learning video product based on Instagram media for the topic of reaction rates. This is demonstrated by the feasibility results that have been tested for validity based on content and media validity aspects, with an average content validity result percentage of 95.8% and media aspect with an average percentage of 98.2%. Furthermore, very good responses were obtained from students and teachers, so the learning video can be used as a learning alternative. This is demonstrated by the results of student and teacher response tests. The average percentage of student responses in small group tests was 88.3%, the average percentage of student responses in large group tests was 91.2%, and the average

percentage of teacher responses was 88%. Therefore, it can be concluded that the Instagram-based learning video on the topic of reaction rates is declared very suitable for use.

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