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ANIMATION-BASED MEDIA OF LEARNING CHEMISTRY ON HYDROCARBON AND CRUDE OIL MATERIALS

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Abstrak: Penggunaan media pembelajaran di kelas menjadi salah satu alasan ketertarikan siswa dalam mempelajari materi yang disampaikan oleh guru. Selain itu, penggunaan *Microsoft PowerPoint* sebagai media pembelajaran dapat dioptimalkan kegunaan dengan mengembangkan media video animasi melalui aplikasi tersebut. Penelitian ini bertujuan untuk menghasilkan media pembelajaran berbasis video animasi kimia menggunakan *Microsoft PowerPoint* yang dapat memvisualisasikan materi hidrokarbon dan minyak bumi secara lebih menarik kepada siswa serta mengetahui respon siswa terhadap media pembelajaran yang dikembangkan. Proses pengembangan menggunakan model ADDIE yang terdiri dari: (1) *analyze* (analisis), (2) *design* (perancangan), (3) *development* (pengembangan), (4) *implementation* (penerapan), dan (5) *evaluation* (penilaian). Instrumen yang digunakan dalam penelitian ini meliputi instrumen analisis kebutuhan, lembar validasi *storyboard* video animasi, lembar validasi *prototype* video animasi, lembar validasi angket respon siswa, serta angket respon siswa. Hasil penelitian diperoleh dari pengujian uji coba terbatas kepada siswa dan guru. Hasil pengujian kepada siswa mendapatkan persentase rata-rata 84% dengan kriteria sangat baik. Media pembelajaran video animasi yang dikembangkan dapat digunakan sebagai media alternatif pada proses pembelajaran di kelas.

Kata Kunci: Hidrokarbon, Minyak Bumi, Pengembangan Media, Video Animasi

Abstract: *Media use in teaching and learning helps teachers gain students' attention. Using Microsoft PowerPoint as the teaching media can optimize usability by developing animated video media through the application. This study aims to produce learning media based on chemical animation videos using Microsoft PowerPoint to visualize hydrocarbons and crude oil materials attractively to students and to find out students' responses to the learning media developed. The development process uses the ADDIE model, which consists of (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation. The instruments used in this study consisted of needs analysis instruments, animated video storyboard validation sheets, animation video-prototype validation sheets, student questionnaire validation sheets, and student response questionnaires. The results of the study were obtained from limited trial testing of students. The test results for students got an average percentage of 84% with excellent criteria. The animation video learning media developed can be used as an alternative media in the learning process in the classroom.*

Keyword: *Hydrocarbons, Crude Oil, Media Development, Video Animation*

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1. INTRODUCTION

The world of education is currently required to prepare superior human resources (HR). It is intended that they can compete with other countries to face global competition. Therefore, it is necessary to improve the quality of education. In this case, the teacher plays a significant role in improving the quality of education by organizing a quality learning process in schools.

A quality learning process is a learning process that occurs when students can achieve the expected learning objectives. Utilization of learning media in learning activities is one way to improve the quality aspects of learning (Indriyani, 2019). The use and selection of appropriate instructional media can provide benefits in improving the quality of student learning outcomes and is useful as a means of attracting students' attention when receiving learning material presented by the teacher.

When the learning process is only through reading activities without any other media, then the level of remembering students on the subject matter is only 10%. Furthermore, when learning, students listen to the teacher's explanation, and the level of a student remembering the subject matter is 20%. However, when the learning process uses audio-visual learning media, student recall of the subject matter increases to 30%. However, in implementing or implementing the use of learning media, it has not been used optimally as a learning tool in schools (Research Team of Ministry of Education, 2016). According to the Pustekkom Kemendikbud survey results, only 40% of teachers understand using information and communication technology in the learning process. Meanwhile, 60% of teachers still have difficulty using information and communication technology in teaching activities (Astini, 2019). In addition, based on the researcher's observations during the Teaching Practice (PLP), students and teachers confirmed that the learning media that is often used is generally only PowerPoint. Making presentation slides in Microsoft PowerPoint can be one of the reasons students are interested in learning the material presented by the teacher in class. Students will get bored quickly when the presentation material presented by the teacher only presents writing. So we need learning media that can assist teachers in delivering material more interestingly and visualize the material that students will study. The use of learning media is expected to improve the quality of education.

According to Munadi (2008), Learning media is a device or tool that can be used to present and deliver learning material in a structured and conceptual way. To make the learning atmosphere conducive and students carry out learning activities efficiently and on target. Learning media can be an alternative for students studying the material in the classroom. Various types of learning media used in the learning process have a positive impact on helping information search, displaying accurate simulations, and increasing student literacy (Aisyah et al., 2020).

Students have difficulty learning chemical materials, one of which is hydrocarbon (Uchegbu, 2016). Students have difficulty studying hydrocarbon material because, in hydrocarbon material, there are many terms that students must memorize. The terms that must be memorized are foreign to students because they are the names of compounds that have never been known (Pratiwi et al., 2013). In addition, many students still do not know about the relationship between hydrocarbon materials and everyday life. Their knowledge is only based on the teaching materials provided by the teacher. (Virginia et al., 2018). It can limit knowledge and make students bored quickly during lessons. It is because hydrocarbons are solid materials and require a longer time to convey in class.

Therefore, it is necessary to use learning media to help students understand chemistry subjects, especially hydrocarbon and crude oil materials that require visualization, so learning in class becomes more interesting. Animated video-based learning media can be an alternative solution. Animated video media is a medium that can visualize chemical material by presenting moving images and sounds that can make teaching and learning activities more engaging, interactive, and fun. (Agustien et al., 2018). In addition, according to Dalacosta, animated video is an excellent medium to increase students' academic attention and interest in delivering material during learning activities (Chan, 2015).

Based on the explanation above, this research aims to develop animated video-based chemistry learning media on hydrocarbon and crude oil materials and to determine students' responses to the animated video-based learning media.

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2. RESEARCH METHODS

In the research method the author should write down the entire material including the tools and materials used including the specifications. The authors should also include clear research procedures. The research method is written in Times New Roman font 11 size, single space. The research was conducted from March 2019 – March 2020 at SMA AL-Hasra Depok, with the object of research in the form of animated video-based learning media and research subjects consisting of 4 expert lecturers and 75 students of class XI science at SMA Al-Hasra Depok. The research method used is Research and Development (R&D), which aims to produce specific products, and test the effectiveness of the resulting products (Sugiyono, 2011). While the research model used is the ADDIE model. The ADDIE model is one of the most commonly used models in developing learning media to produce effective product designs (Aldoobie, 2015).

The steps for developing animated video-based learning media refer to ADDIE development activities, including analysis, design, development, implementation, and evaluation. In this learning media development research, the researcher limits the research stage only to the implementation stage. Research data collection techniques use interviews, validation sheets, and respondent questionnaires.

The data analysis techniques used in this research are needs analysis, data analysis validation of animated video storyboards, instrument data analysis of learning media validation sheets by experts, data analysis of student response of validation instruments, and data analysis of student responses to learning media.

The scale used in student responses to animated video learning media is a Likert scale with four answers (Viandhy & Ratnasari, 2014).

Table 1. Media Validation Instrument Scoring Guidelines.

No.	Criteria	Score
1.	Strongly Agree	4
2.	Agree	3
3.	Disagree	2
4.	Strongly Disagree	1

Next, interpret the data based on the results of the Likert scale calculation using the product qualification rating scale (Riduwan, 2007).

Tabel 2. Product Qualification Rating Scale

Criteria	Interpretation
$81\% < X \leq 100\%$	Strongly Reliable
$61\% < X \leq 80\%$	Reliable
$41\% < X \leq 60\%$	Quite Reliable
$21\% < X \leq 40\%$	Unreliable
$0\% < X \leq 20\%$	Strongly Unreliable

3. RESULTS AND DISCUSSION

From a series of research on the development of learning media in the form of animated videos using the ADDIE model, the following are the results of developing chemistry learning media based on animated videos on hydrocarbon and crude oil materials, including analysis, design, development, implementation, and evaluation. However, this study is limited only to the implementation stage.

In the analysis process, the needs analysis results based on interviews with students and chemistry teachers show that chemistry teachers generally use learning media only in the form of presentation slides and have never used chemical animation-based videos before. Then based on the questionnaire analysis of student responses to chemistry subjects, the following results were obtained:

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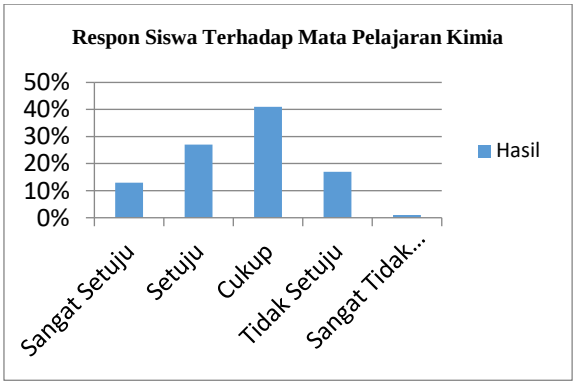

Figure 1. Student Responses to Chemistry Subjects

Based on the data in Figure 1 above, it can be seen that 13% of students strongly agree, 27% of students agree, 41% of students consider it sufficient, 17% of students disagree, and 1% of students strongly disagree. From these results, it can be seen that there are problems in chemistry lessons. First, most still think that chemistry is a complex subject. Chemistry has been a difficult subject for students because many chemistry concepts require a deeper understanding, less appropriate learning methods in the classroom, and the lack of teaching aids or media (Atagana & Engida, 2014).

Students still have difficulty understanding chemical materials, one of which is hydrocarbons and crude oil, which has a reasonably broad scope (Effendi, 2016). It can be seen from the number of students who have not been able to complete the practice questions well. Following the research conducted by Uchegbu (2016), students find it difficult to learn some chemical materials such as gas law, mass-volume relations, hydrocarbons, and alkanols. Based on these results, the researchers chose hydrocarbon and crude oil materials as materials to be developed in animated video learning media.
Furthermore, student responses to the desire to use animated video-based learning media in chemistry learning are as follows:

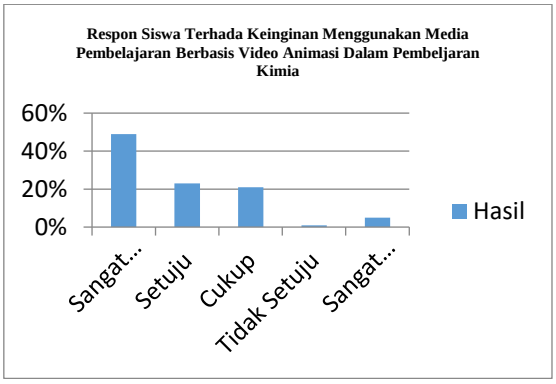

Figure 2. Student Responses to the Desire to Use Animation Video-Based Learning Media in Chemistry Learning

Based on the data in Figure 2 above, it can be seen that 49% of students strongly agree, 23% of students agree, 21% of students consider sufficient, 1% disagree, and 5% of students strongly disagree. It follows the teacher's statement at the time of the interview. According to the chemistry teacher at Al-Hasra High School, it is very feasible to develop animated video learning media. He hopes for this media because it can be a reference for students when getting assignments from the teacher to explain the material. Therefore, the development of animated video-based learning media was chosen as the instructional goal in this study.

The next stage in the process of developing animated video-based learning media is the design stage. At this stage, several activities are carried out that are used to design the learning media that will be made. The first step in the design stage is to create a storyboard. Storyboarding is done by analyzing core competencies and essential competencies and developing indicators that refer to the Attachment of

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the Minister of Education and Culture No. 24 of 2016 concerning core competencies and essential competencies of the 2013 primary and secondary education curriculum.

The process of making storyboards containing hydrocarbon and crude oil chemicals is made in the form of a storyline.

Figure 3. Chemical animation video storyboard on the unique material of the carbon atom

The animated video storyboard that has been made is then validated regarding the storyline in the animated video storyboard and its suitability with chemical content. 2 material experts carry out the validation process.

Table 3. Storyboard Validation Results by Material Experts

No.	Storyboard	Percentage	Criteria
1.	Video 1 (Characteristics of the Carbon Atom)	87%	Strongly Reliable
2.	Video 2 (Alkanes)	87%	Strongly Reliable
3.	Video 3 (Alkene)	90%	Strongly Reliable
4.	Video 4 (Alkyne)	93%	Strongly Reliable
5.	Video 5 (Crude oil)	89%	Strongly Reliable
6.	Video 6 (Complete and Incomplete Combustion Reaction)	95%	Strongly Reliable

The results of the animated video storyboards show that the six animated video storyboards are considered very suitable for the chemical content of hydrocarbon and crude oil materials.

The next stage of developing animated video-based learning media is the development stage. At this stage, prototypes of learning media based on animated videos are made, validation of learning media prototypes, and prototypes of animated video-based learning media are revised.

1. Digitizing images based on storyboard sketches made using Adobe Illustrator CS 6.

Figure 4. Making digitized images based on storyboard sketches using Adobe Illustrator CS 6

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2. Creating structures from hydrocarbon compounds, 3D molecules, and other chemical reactions.

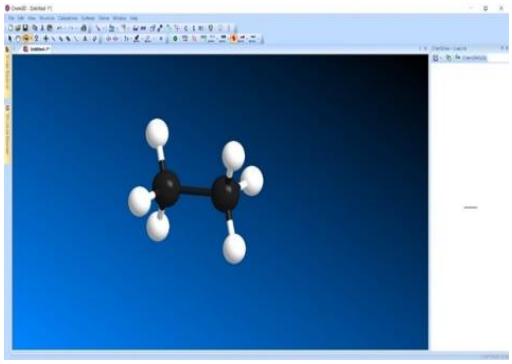

Figure 5. Making structures from hydrocarbon compounds using the Chemdraw Ultra v.14.0.

3. Next is to animate or move the image that has been made into a video based on the storyline on the animated video storyboard using Microsoft PowerPoint 2016

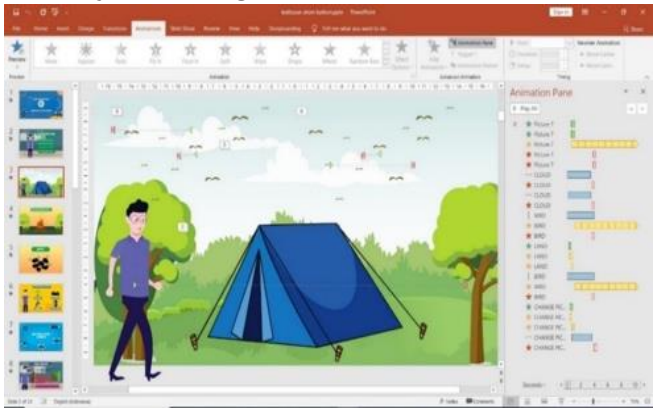

Figure 6. Animate or move images using Microsoft Powerpoint 2016

4. Creating audio recordings used as the narration in animated videos using the Adobe Audition CS 6.

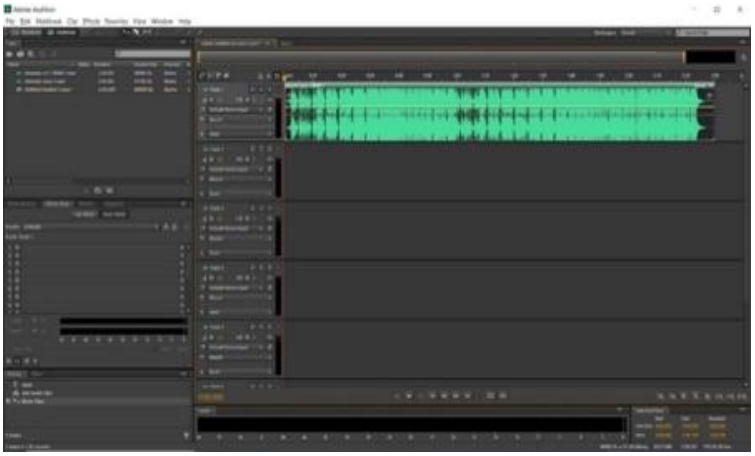

Figure 7. Creating voice recordings using Adobe Audition CS 6

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5. Combine the entire animated image with sound recordings and back sound music using the Adobe Premiere Pro CC 2017.

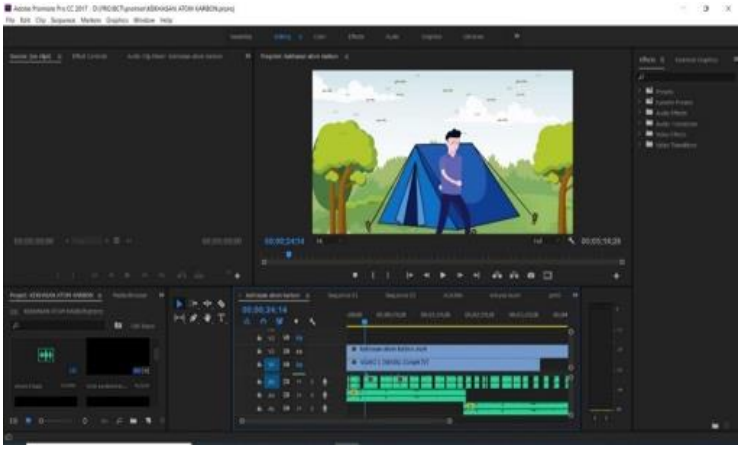

Figure 8. Combine images, sound recordings, and background music using the Adobe Premiere Pro CC 2017.

After the media prototype has been produced, the validation stage of the learning media prototype based on animation video is continued. The validation process will provide the results of a feasibility assessment of a developed media. The validation process for the animated video prototype was carried out by four people consisting of two material experts and two media experts.

Table 4. Validation Results by Material Experts

No.	Indicator	Percentage	Criteria
1.	Material Suitability	98%	Strongly Reliable
2.	Affective Impact	100%	Strongly Reliable
3.	Benefits	88%	Strongly Reliable
Average		95%	Strongly Reliable

The results of the validation by material experts get an assessment of the material suitability indicator of 98%, the affective impact of 100%, and the usefulness of 88%, and the average percentage of all aspects is 95% with very feasible criteria, meaning that animated video learning media in material aspects.

Table 5. Validation Results By Media Experts

No.	Indicator	Percentage	Criteria
1.	Message Quality	97%	Strongly Reliable
2.	Performance	88%	Strongly Reliable
3.	Text Readability	88%	Strongly Reliable
4.	Image Presentation	88%	Strongly Reliable
5.	Sound Element	84%	Strongly Reliable
Average		89%	Strongly Reliable

The results of validation by media experts get an assessment of the message quality indicators of 97%, performance 88%, text readability 88%, image presentation 88%, sound elements 88%, and the average percentage of all aspects of 89% with very feasible criteria meaning learning media animated videos in the media aspect. Based on the validation of material experts and media experts who get very decent criteria, the learning media can be used for the implementation phase for students.

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The next stage is the implementation stage of animated video learning media for students. The implementation process is conducted with a limited trial to determine the response to the developed animated video learning media. The trial was conducted to determine the student's response to the developed animated video. The test shows the value of 5 aspects: interest in media, mastery of the material, appearance, implementation, and audio. The following is the result of a limited trial of animated video learning media:

Table 6. Limited Trial Results of Animated Video Learning Media on Students

No.	Aspect	%	Criteria
1.	Interest in media	78%	Good
2.	Material mastery	82%	Excellent
3.	Design	88%	Excellent
4.	Implementation	86%	Excellent
5.	Audio	84%	Excellent
Overall Average		84%	Excellent

The percentage of interest in the media is 78% with good criteria; this can be seen in four indicators with excellent and good scores. The first indicator is that students are interested and motivated to learn when using animated video media, which has the highest percentage of 83%. Based on these results, it is undeniable that animated video media can foster student learning motivation. It is because using animated video media in learning activities can attract students' attention so that student learning motivation can grow (Muslimin, 2017). In addition, also when compared to learning that only uses text, learning that uses videos can help students understand the material more efficiently, increase motivation, and provide convenience in teaching (Shiu, 2019).

The second indicator, students can learn actively and independently with animated video media, has a percentage of 77%. In addition, it is also related to the third indicator, namely, students can learn according to their speed and ability to learn independently using animated video media, which has a percentage of 73%. It is because videos allow students to learn at their own pace, in their own time, and in the comfort of their environment. They also provide a way to learn independently without being dependent on others (Chan, 2010).

Also, the fourth indicator, regarding learning to use animated videos, makes students focus and not get bored of the material presented, which has a percentage of 79%. That is, animated video media can attract students' attention to focus and not get bored of chemical material. It was also expressed by Hidayah (2017) that students are not bored with the material delivered with learning media because the material becomes more interesting with the appearance of moving images and text accompanied by additional sound. The use of animation and interesting effects will make the display of learning media excellent and effective to attract the attention of students in learning activities during initial or final learning activities both at school, at home, or in other places without being limited by time. Therefore, animated video-based learning media has an excellent response in terms of implementation.

4. CONCLUSIONS

The results of student responses to the animation video learning media that were developed overall were 84% (excellent). Where the aspects assessed include: aspects of interest in the media, aspects of material mastery, aspects of appearance, aspects of implementation, and aspects of audio. It can be concluded that animated video-based learning media has an excellent response and can be used in the chemistry learning process in schools.

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