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Research Article

Development of powtoon web apps assisted colloid system material animation video to increase students' interest in learning

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Keywords

Animated video
Colloid system
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Powtoon

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Abstract

Colloidal material is theoretical and abstract, making it less attractive to students studying it. This study aims to develop an animated video for colloidal system material using the Powtoon web app and test its quality. This research method is Research and Development (R&D) using the ADDIE development model. Product assessment is carried out using product quality assessment sheets and student responses. Data analysis techniques use qualitative and quantitative analysis techniques described in descriptive form. The results of the evaluation of animated videos by material experts obtained an ideal percentage of 98.1% in the very good category, media experts 90% in the very good category, reviewers 94.8% in the very good variety, and students responded positively with a percentage of 93.4%. Based on the assessment results, it was concluded that the animated video developed could be used as an alternative learning medium in colloidal system material to increase students' interest in learning.

Introduction

In the Industrial Revolution 4.0 era, educational technology has become a byword constantly discussed in education (Surani, 2019). Educational technology is defined as technology related to educational activities and aims to facilitate teachers in achieving learning goals (Jumhana et al. 2021). Ardian et al. (2021) stated that technology in education can make it easier for students to find education-related information. In addition, educational technology also makes it easier for students to access and share subject matter with other students, thereby making learning easier (Fania et al. 2022). However, in practice, as many as 75% of teachers still need help applying educational technology to learning activities (Janattaka and Santoso, 2022).

The existence of the COVID-19 pandemic outbreak has caused learning activities to be carried out by implementing a Distance Learning system (Dewi, 2020). This learning system requires teachers and students to carry out learning activities online (Khikmawati et al. 2021). As long as this system is implemented, students must carry out teaching and learning activities in front of a cellphone or laptop screen for quite a long time (Pujiasih, 2020). This learning system causes students to experience a decrease in increased learning (Utami and Cahyono, 2020). In addition, the learning media teachers use in online education are still conventional, such as books and worksheets, which need to be revised in their application (Zulkifli et al. 2021). This condition resulted in a decrease in student learning interest (Abriata, 2022). Learning media is crucial in understanding learning material (Wijayanti and Siskawati, 2021). Learning media is a tool that contains information to stimulate students' thoughts and feelings (Apsari et al. 2020). Therefore, appropriate learning media is needed for students' attention in the learning process. However, the reality is that many of the learning media teachers use are in printed form, so they do not attract students' interest in learning (Setiawan and Mulyanti, 2022).

Interest in learning is essential in the learning process (Fadilah et al. 2022). Learning activities can occur if there is an interest or desire to learn from students (Octavianty et al. 2022). Interest is an individual's tendency toward what is considered attractive (Mesra et al. 2021). Interest is the first step in the learning process for students to achieve what they want, giving rise to the perception that students with high learning can make it

easier to achieve their goals (Khikmawati et al. 2021). The increased interest in learning will help students understand learning material easily (Fadillah and Bilda, 2019). However, the fact is that based on research results, students' interest in learning in Indonesia still needs to be higher (Handayani and Wulandari, 2021).

Audiovisual-based learning media can be a solution to increase student interest in learning (Octavianty et al. 2022). Audiovisual-based learning media is learning media that can be seen and heard by students (Astuti et al. 2020). Audiovisual media can be animated videos containing text, images, and sound (Fadillah and Bilda, 2019). Using animated videos in the learning process has proven effective in helping students understand abstract learning material (Hidayat, 2020). Animated videos make patients more enthusiastic and not bored with learning (Darmaningrat et al. 2020). Animated videos make it easier for teachers to teach material easier. However, the facts on the ground show that currently circulating animated videos for learning have yet to be packaged attractively, and few teachers still develop attractive software (Octavianty et al. 2022).

The limitation of teachers having software to develop learning animated videos is due to the paid application (Riwayati et al. 2022). Powtoon is an online web application that can be used to create animated videos for free (Sukiyanto and Choirun, 2021). Teachers and students can access the resulting videos to be used anywhere and anytime (Raditya and Kristiani, 2022). Powtoon has complete exclusives, such as creating moving objects, audio, presentation time, transition effects, and timeline settings (Riski and Rosiyanti, 2021). In addition, the Powton application does not need to be installed on a laptop or computer, making it easier for teachers to use (Basuki and Sholeh, 2021). Therefore, using Powtoon as a learning medium today is the right choice (Ibrahimi and Suryanti, 2022).

One of the abstract chemical materials is the colloid system (Purba, 2019). This abstract nature is because colloidal chemistry is oral (Ardian et al. 2021). Students feel unfamiliar with colloidal system material because there are many new vocabulary and terms in learning colloidal material (Eliza and Yusmaita, 2021). The material of the colloidal system is related to the size of the particles and the motion of the particles in the medium (Parera et al. 2022). Colloidal system material is commonly used daily (Firdausi and Sucahyo, 2021). However, teachers usually do not teach colloidal system material in class due to limited time allocation, which causes low student understanding (Prasetyo et al. 2021). The Powtoon animated video is an alternative learning media to study colloidal system material (Laili et al. 2022). In effect, students will learn new nuances, and teachers will find it easier to explain colloidal system learning material (Hidayat, 2020).

Based on the problem description above, this research is needed to develop audiovisual-based learning media on colloidal system material with the help of the Powtoon web apps. The existence of this animated video is expected to make abstract colloidal material more concrete and help students better understand the interrelationships of colloidal material in everyday life. In addition, the animated video developed can be an alternative to explaining theoretical colloidal system material to motivate students to learn colloidal material, so this study aims to develop a product in the form of an audiovisual-based animated video using the Powtoon web app on colloidal system material.

Method

This study used the Research and Development (R&D) method. The development model that is used is the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model (Dick and Carey, 1996). This model is often used to develop software and learning materials based on user needs (Jais et al. 2022). Because of its flexibility, this model can be modified according to user needs to create the desired innovation (Putri et al. 2022). The ADDIE model is used in this study because it can be a systematic and programmed guide for developing effective, dynamic, and supportive learning (Suratnu, 2023). The research flow is presented in Fig.-1.

Stage analysis was conducted through interviews and observations of chemistry teachers from SMA N 3 Bekasi, SMA N 13 Bekasi, SMA Islam PB Soedirman 1 Bekasi, MAN 2 Kota Bekasi, MA eL-BAS Ciamis, SMA N 5 Yogyakarta, Al-Azhar Islamic High School 9 Yogyakarta, and 40 students in Class XI at SMA N 5 Yogyakarta. Interviews and observations were conducted to analyze needs and identify products to be developed. The information obtained determines the product's characteristics to be developed. The design stage is the planning and development stage of teaching materials and assessment instruments. The results of the design stage are product prototypes used in the development stage. The development stage contains activities to realize product designs designed in the previous step. This stage is carried out by making products with the help of software.

The implementation stage is in the form of product application in the learning process. The evaluation stage is in the form of student input after using the product developed through student responses.

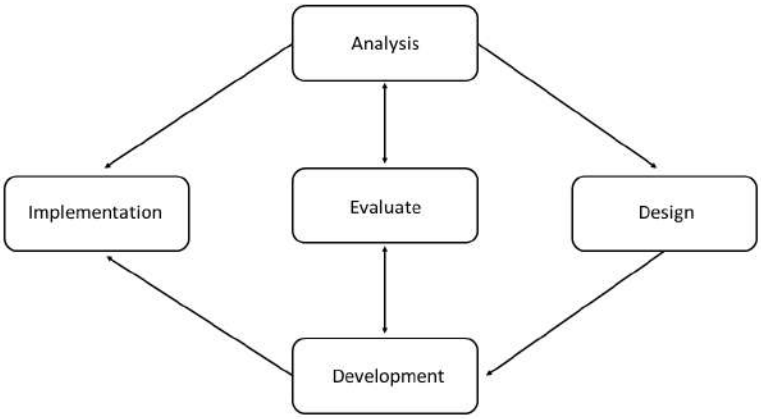

Fig.-1. The ADDIE Model (Dick and Carey, 1996)

Material and media experts then validate and assess the products made to obtain input and assessments of the products being developed. The instruments used in the research were product validation sheets, product quality assessment sheets, and student response sheets. The product quality assessment instrument was prepared using a Likert scale, while student responses used the Guttman scale. Instrument experts validated the research instruments compiled. Then, the quality of the product was assessed by one media expert, one material expert, and five teachers as reviewers. The data obtained were then analyzed using qualitative and quantitative methods and presented in a descriptive form. The analysis results are used for further product revisions in the implementation and evaluation stages.

Data analysis techniques were carried out by changing the results of assessments from media experts, material experts, and reviewers in the form of qualitative data into quantitative data based on a Likert scale. The average value of each aspect and all aspects of assessing the scores obtained is calculated. The average value can be calculated using the formula:

$$\bar{X} = \frac{\Sigma x}{n}$$

$\bar{X}$ = Average score
Σx = Total score of each assessor
n = Number of appraisers

The score obtained is then translated into a qualitative value to make the score a five-point scale, as shown in Table 1.

Table 1. Ideal Assessment Criteria

Score Range	Category
Xi + 1.80 SBi < $\bar{X}$	Very good
Xi + 0.60 SBi < $\bar{X}$ ≤ Xi + 1.80 Sbi	Good
Xi – 0.60 SBi < $\bar{X}$ ≤ Xi + 0.60 Sbi	Enough
Xi – 1.80 SBi < $\bar{X}$ ≤ Xi – 0.60 Sbi	Less
$\bar{X}$ ≤ Xi – 1.80 Sbi	Very Less

The Guttman scale is used to turn student responses into quantitative data in the form of a score. The data is converted into a score, and the percentage of product ideality is calculated. According to Sugiyono (2019), the following formula is used to compute the optimal rate:

$$\%= \frac{Average\ score}{Ideal\ maximum\ score}\ x\ 100$$

Results and Discussion

Analysis Stage

The analysis phase aims to analyze needs and identify products to be developed, such as observations and interviews. Based on observations and interviews with chemistry teachers, information was obtained that the learning media used by teachers were textbooks, PowerPoint, and material summaries. Students also tend to feel bored and less interested in the appearance of existing learning media because they seem monotonous. Most of the teacher's learning media during the COVID-19 pandemic were also in YouTube videos. However, to follow the content presented in class, the content in the video must follow the content in class. Therefore, learning using videos has yet to be done. Teachers also need help to create appropriate learning videos. This is because the software and skills the teacher possesses are limited, so the teacher needs help making interesting learning videos and learning content.

Audiovisual-based playful video learning media has proven to be effective in helping students understand learning material that is abstract and theoretical because its appearance can increase students' motivation to learn (Darmaningrat et al. 2020; Hidayat, 2020) and it can be joyful at the same time (Shiu et al. 2020). These videos must be joyful, creative, and attractive, making students feel more comfortable studying.

Design Stage

At this stage, the planning process is carried out for the development of teaching materials, which includes several activities such as compiling teaching materials, designing learning scenarios, selecting competency teaching materials, determining the type of learning media, and designing learning materials and evaluation tools used with a learning approach. The learning type used animation media audio-visual-based learning using a student-centered approach. Development is done with the help of software such as Powtoon, CapCut, Adobe Podcast, Canva, PowerPoint, and smartphone recorders. In addition, supporting websites such as www.remove.bg and www.unscreen.com are used to remove the background from images and videos and convert them to the .gif format. Making an animated video starts with compiling the entire video design according to the script created using the Powtoon Web Apps. Making a video begins with making the necessary visualizations and graphic designs and making graphic designs using Canva by adding the characters and animations needed in the video to produce an attractive appearance. The process of making an animated video is presented in Fig.-2 and Fig.-3.

Fig.-2. Animated Video Creation Process.

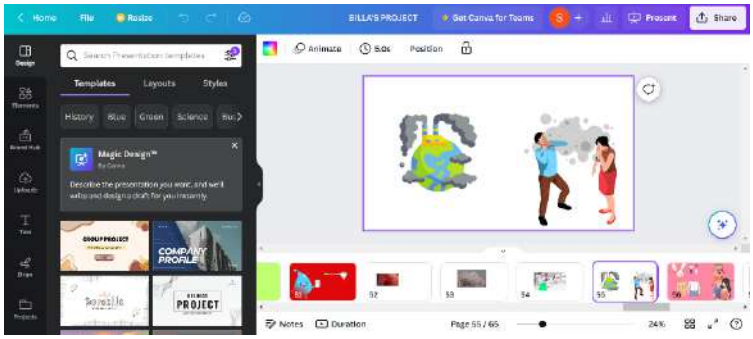

Fig.-3. The Process of Editing Images Using Canva.

Making animated videos is continued by adding audio and improving audio quality. Audio production is done using a recorder on a smartphone, and then the audio quality is refined through Adobe Podcast. This process is presented in Fig.-4 and Fig.-5.

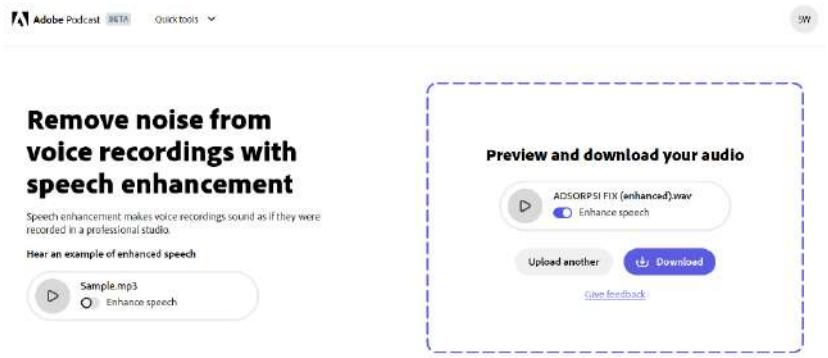

Fig.-4. Audio Cleaning Process Using Adobe Podcast

Fig.-5. Audio Recording Process

Adding audio is done with the help of the CapCut software, which can be downloaded for free at the Microsoft Store (Windows) and the App Store (macOS). CapCut software adds audio, cuts, combines and manipulates audio. A back sound is added to make the video more enjoyable, which can be downloaded on YouTube Studio for free. Then, the backsound is added and combined with the video using CapCut. Furthermore, the video is exported in .mp4 format at a 1920 x 1080 px (Full HD) resolution for more evident screen quality. The audio editing process using CapCut is presented in Fig.-6.

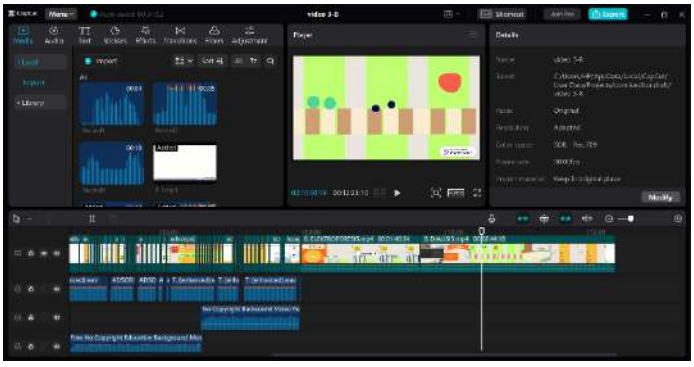

Fig.-6. Audio Editing Process

The final product produced was four Powtoon animation videos on the sub-material of colloid understanding, components, types of colloids, colloid properties, and colloid uses, lasting approximately 3-12 minutes Each video contains an opening, content, and closing in the form of credits. The opening section includes introductions, video titles, and learning objectives. Learning objectives are skills that students must acquire in their learning process, which can benefit both students and teachers as it allows for a better understanding of the material to be studied. The opening section is presented in Fig.-7.

Fig.-7. The Opening Section of the Animated Videos

The content section is an essential part because this section contains a description of colloid system material (Anggraeni et al. 2021). The material presented is designed as animation associated with colorful design, exciting symbols, and contains everyday phenomena that can be more imagined, such as insecticides, to help us. The material contained in the contents section is presented in Fig.-8.

Fig.-8. The Contents Section of Colloid System Material

Fig.-9. Bulletin Questions

The combination of colors and attractive design makes students feel new nuances in learning (Tomita, 2022). These design makes students feel pleasure, interest in learning, and raise attention and student involvement (Kolovelonis and Goudas, 2022). This video included questions bulletins in the content section. These questions encourage students to be more active (Sulistyaningrum et al. 2023) and directly involved in learning activities to create two-way communication. Question bulletin scenes will equip students with critical thinking skills and guide them through science-based learning The presentation of question bulletins is presented in Fig.-9.

Fig.-10. The Closing Section of Animated

These bulletin questions attract students to explore further the material being studied so that they can construct their insights and encourage students to be more sensitive to their environment. These questions will increase students' interest in reading and the level of students' critical thinking, which is needed in the current era of Society 5.0 (Ab Latif and Mat Nor, 2020). However, these questions have not accommodated group work for students. The closing section contains credit as a gratefulness to the people involved who played a role in preparing the video. The closing section is presented in Fig.-10.

Development Stage

The videos developed were then validated and assessed for quality. Assessment is carried out using product quality assessment instruments and student responses. Aspects used in determining product quality include content, language, video characteristics, and learning interest. At the same time, parts of student response assessment consist of material, speech, presentation, and interest in learning. The assessment was conducted by one media expert, a material expert, five high school chemistry teachers, and 40 students from class XI at SMA N 5 Yogyakarta. The Score of the Product Quality Assessment and the Student Responses are presented in Table 2.

Table 2. Score of Assessment Quality and Student Responses

Assessment of Product Quality/Student Response	Assessment Aspects	Σ Score	Σ Maximum Ideal Score	Ideal Percentage	Category
Material Expert	Content	14	15		
	Language	20	20	98.1%	Very good
	Interest to learn	20	20		
Media Expert	Video Characteristics	18	20	90.0%	Very good
Reviewer (Chemistry Teacher)	Content	14.6	15	94.8%	Very good
	Language	18.4	20		
	Video Characteristics	19.4	20		
	Interest to learn	9.2	10		
Student	Material	9.5	10	93.4%	Very good
	Language	9.0	10		
	Presentation	9.5	10		
	Interest to learn	9.375	10		

Based on Table 2. the quality of audiovisual-based animated videos on colloidal system material with the help of the Powtoon web apps gets the Very Good category with an ideal percentage by material experts of 98.1%, media experts of 90.0%, and reviewers of 94,.8%. The quality assessment results indicate that the animated video developed has material content that can increase students' knowledge, and the language is comprehensible and easy to communicate. At the same time, the presentation is entertaining enough to

encourage students to be interested in learning about colloidal system topics. This enthusiasm for animated videos encourages students to be engaged in learning.

Forty students from class XI at SMA N 5 Yogyakarta filled out a questionnaire to determine the quality of the students' animated videos from material, language, presentation, and interest in learning. Based on student responses, the quality of the developed animated video obtained an ideal percentage of 93.4% in the outstanding category. In addition, interest in learning gets a rate of 93.75%. These results indicate that the learning media can generate and increase students' learning interest in colloidal material. Overall, the animated video developed is sufficient for students' needs and expectations of learning media on colloidal system material. The generated media can increase students' interest in learning and be alternative learning media in the classroom. The results of this study are per research conducted by Fadilah et al. (2022), which stated that Powtoon animated videos were able to increase student interest in learning. Then, based on student input, an animated video is produced that suits the needs of students, significantly increasing student interest in learning.

Conclusion

This study aimed to develop an animation video on colloidal system material assisted by Pow Toon web apps that can be used in teaching and learning activities as a learning medium based on educational technology and current conditions. The development model used is the ADDIE model. Based on the assessment results, this animated video obtained an ideal percentage of 98.1% from material experts, 90% from media experts, 94.8% from reviewers, and 93.4% from student responses in the very good category. Therefore, the animated video developed can increase students' interest in learning and is suitable as an alternative learning media in classroom learning.

Conflict of Interests

The author (s) declares that there is no conflict of interest in this research and manuscript.

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