DEVELOPMENT OF INSTAGRAM AND TIKTOK-BASED LEARNING MEDIA ON QUALITATIVE ANALYSIS MATERIAL OF GROUP I AND II CATIONS WITH A MULTI-REPRESENTATION APPROACH

Tria Anggraini, State University of Malang, East Java, Indonesia
Hayuni Retno Widarti, State University of Malang, East Java, Indonesia
Deni Ainur Rokhim, State University of Malang, East Java, Indonesia;
Chemistry and PKWU, SMAN 3 Sidoarjo

ABSTRACT

Analytical chemistry is one of the chemical materials that is considered difficult by students. The application of multi-representational proximity in delivering analytical chemistry material can make it easier for students to understand the material. The purpose of research and development is to produce Instagram- and TikTok-based learning media products on qualitative analysis materials for class I and II cations with a multi-representational approach, testing the feasibility of learning media in the form of Instagram and TikTok learning content, and to find out the response of students to the learning media. This research uses ADDIE research and development design. The ADDIE development model consists of five stages, namely analysis, design, development, implementation, and evaluation. At the development stage, validation of media and material experts by lecturers of the chemistry department, State University of Malang, as well as teacher chemistry SMKN 7 Malang continued the readability test on 52 students of class XI Analytical Chemistry 1 and 2. The questionnaires used are quantitative, processed with a Likert scale. The results of this research and development are in the form of learning content on the qualitative analysis material of group I and II cations uploaded on Instagram and TikTok, with a "very decent" validation value in general display, receiving a percentage of 84%; in presenting the material, 84%, the "very feasible" category; and in the results of the questionnaire, student responses are classified as "very good," with a percentage of 81%. Instagram- and TikTok-based learning media are very feasible to use, and students show that Instagram- and TikTok-based learning media are very interesting when coupled with explanations interspersed with songs, helping readers who have auditory properties, so that students understand, are interested, and have fun learning with digital methods.

Keywords: *social media, multi-representation, qualitative analysis of cations*

INTRODUCTION

Chemistry is one of the branches of natural science that explores the character, structure, and changes in matter. The science of chemistry is abstract and dominated by knowledge of concepts. The results of observations made by Kurniasih & Rahayu (2017) show that the tendency of students who are active in chemistry learning is still lacking. The learning process is still centered on the information provided by the teacher, therefore it is less interesting. Students still have difficulty understanding chemistry because the learning carried out by the majority of teachers uses the lecture method, so it is less engaging for students. One of the materials studied in chemistry is analytical chemistry (Dwiningsih & Sukarmin, 2018).

Analytical chemistry is a branch of chemistry that studies the separation and identification of chemical compounds both qualitatively and quantitatively, using separation methods which also require conceptual, factual, and procedural understanding (Kurniasih & Rahayu, 2017). Based on research conducted by Fathonah et al. (2015) at the Bhakti Mulia Vocational High School, out of 30 students, 53.33% think that qualitative analysis material is difficult to understand. Therefore, an approach is needed that can help students understand analytical chemistry. A multi-representational approach can help students understand the concept of chemistry as a whole (Widarti, et al., 2022c).

The application of a multi-representational approach to explain the process of changing a material in chemistry will help students more easily understand the lesson. The multi-representational approach in chemistry includes three levels of representation: macroscopic, submicroscopic, and symbolic (Farida et al., 2020). According to Widarti, et al. (2022b), chemical phenomena that can be observed with the human senses belong to the level of macroscopic representation. Macroscopic representation includes shape, color, and smell. Submicroscopic representations describe processes that cannot be observed by the senses of sight, smell, and touch at the particulate level, that includes atoms, molecules, and ions. Symbolic levels are depicted in the form of chemical formulas, reaction equations, stoichiometry, and mathematical calculations. Multi representation is a combination of images, text, and graphics. Submicroscopic representation is a stage that is quite difficult to explain to students because of its abstract nature and invisibility to the naked, eye, so it takes media to visualize it (Widarti, et al., 2022b).

Learning media which contains images, sounds, motion animations, graphics, and videos in one container are needed by students. The development of learning media in the field of education goes hand in hand with technological developments and the use of social media (Syabrina et al, 2022). According to Asrori et al. (2021), research at SMKN 07 Malang in an assessment meeting revealed that as many as 60% of the learning resources that students have is textbooks from teachers, 55% is in the form of PowerPoints, and only 15% is internet sources. The use of technology, such as cell phones as hardware and social media as software, can help students in achieving learning goals (Widarti, et al., 2022a), but it is still not optimally implemented in schools. The application of technology in the development of learning media can emerge from various platforms, one of which is social media. Social media that are in demand by the public and young people are TikTok and Instagram (Oktaheriyani et al., 2020). Students are very interested in using social media such as these platforms. According to the We Are Social report, TikTok has 1.4 billion active users over the age of 18, while the number of TikTok users in Indonesia reaches 99.1 million users as of April 2022 and the number of Instagram users reaches 97.38 million (Herdiati et al, 2021).

Instagram and TikTok users range from young students to college students, but most of them still haven't focused on using TikTok and Instagram as a medium for learning. Social media-based learning can attract the attention of students because of the combination of various aspects, such as images, videos, colors, and various features contained. This is also supported by the current learning principle, namely utilizing information and communication technology to increase the efficiency and effectiveness of learning (Permendikbud 81 A, 2013). According to Widarti et al., (2022c) the use of social media as a learning medium has not been widely studied and researched in the last five years. There are several relevant studies, one of which is carried out by Yumarsa et al. (2020) about the development of media based on Instagram, integral subject matter for high school student

Jatmiko et al. (2020) researched the development of nstagram-based multi-representation media on temperature and hot materials. Novianti et al. (2020) reviewed the development of media Instagram-based learning on the subject matter of function graphs for high school student , and Iqbal et al. (2019) researched the development of video blogs (vlogs) on YouTube with a STEM approach as an alternative to online learning media. Based on several studies, it is said that research has never been carried out regarding the development of Instagram- and TikTok-based learning media in the field of chemistry, especially material on qualitative analysis of cations using a multi-representational approach.

Based on the explanation above, it is important to conduct research on developing Instagram and TikTok content as learning media regarding the material qualitative analysis of group I and II cations using a multi-representational approach, because in this material there are many chemical reactions that require an explanation of three levels of representation. Therefore, this study has been conducted to explore these problems.

METHODS

Research and development is systematic and creative research that combines the development of educational products to help teach and analyze these educational products (Hidayat & Nizar, 2021). Research and development of learning media for qualitative analysis of group I and II cations based on Instagram and TikTok using a multi-representational approach is carried out with the design of ADDIE research and development.

1. Analysis Stage

The analysis stage is carried out to find out and classify the problems experienced by students related to learning media used in schools thus far in the post-pandemic period, then to find solutions by developing interactive learning media. In this stage of analyzing the need for developing learning media, some of the analyses carried out are as follows:

a. **Needs analysis:** At this stage, analyze the basic problems experienced during learning (Hidayat & Nizar, 2021). In this study, an analysis of the problems faced by students for the past two years was carried out, starting from 2020–2022, during the COVID-19 pandemic. This includes adjustments to the learning process that have been carried out by schools during the transition from offline to online, as well as student responses to learning media used by teachers during online learning.
b. **Analysis of students' abilities:** An analysis of the characteristics of students is carried out in terms of the students' skills using the media to be developed (Hidayat & Nizar, 2021). In this study, an analysis covered the types of social media owned by students, social media that was of interest to students, the ability of students to use social media, and school situations to support the development of learning media.

2. Design Stage

The second stage is to design the development of learning media. The model for the development of learning media includes the design of learning media and qualitative analysis materials for group I and II cations in the form of content tables.

3. Development Phase

This third step is to develop learning media based on the media design from the second stage. The stages carried out by researchers in developing learning media in the form of social media are:

a. Create social media accounts. Make feed and short video designs in the form of "reels" in accordance with the design of the content table that has been made.
b. Carry out an assessment of learning media by validating the media and materials contained in the learning content by a team of media experts and material experts.
c. Make improvements and evaluations from the results of learning media validation in accordance with suggestions and input from a team of media and material experts so that there is a comparison of the initial media and the media after improvements are made.
d. Conduct a limited trial for students at SMKN 07 Malang, with as many as 52 students from analytical chemistry classes 1 and 2, with the requirement that students have received qualitative analysis material

for class I and II cations so they can find out the feasibility response of learning media.

e. Make improvements to the product developed based on the suggestions and input of students provided during the trial.

Learning Media Feasibility Analysis

There are two types of data from this development research, namely qualitative data and quantitative data. Qualitative data in this study was obtained from validators' suggestions at the validation stage. Quantitative data are data that describes the results of the feasibility test questionnaire for learning media. Quantitative data can be processed by presenting percentages using the Likert scale for measurement. This scale is arranged in the form of a statement and is followed by five responses. For the purposes of quantitative analysis, the answers can be scored as shown in Table 1.

Table 1.
Assessment Scores Against Questionnaire Answer Choices

No.	Quantitative Analysis	Score
1	Excellent	5
2	Good	4
3	Enough	3
4	Less	2
5	Much Less	1

Source: Sugiyono, 2013

The level of scale measurement in this study used intervals. Interval data can be analyzed by calculating the average of the answers based on the score of each answer from the respondent.

Respondent Answer Percentage = x 100 %

The results of the assessment score are then calculated on average from a number of test sample subjects and converted to the assessment statement to determine the quality and degree of expediency of the resulting product based on user opinions. The conversion of scores into assessment requirements can be seen in Table 2.

Based on the data in Table 2, the development product will end when the assessment score on this learning media has completed the eligibility requirements with the level of suitability of the material and the feasibility of learning media using Instagram and TikTok on the qualitative analysis material of class I and II cations with a multi-representational approach in the "decent" or "good" category.

Table 2.
Learning Media Feasibility Scale

Percentage Score (%)	Interpretation
81%–100%	Very decent/Excellent
61%–80	Decent/Good
41%–60%	Decent enough/Good enough
21%–40 %	Less worthy/Not good
0 %–20 %	Much less worthy/Very poor

Source: Sugiyono, 2013

RESULTS AND DISCUSSION

Technology can be the main choice to be used as a learning medium compared to other learning materials. The selection of appropriate technology can help solve problems in learning (Cahyadi, 2019). According to Mardhiah and Akbar (2018), social media technology has the characteristics of being interactive, practical, flexible, and dynamic when displayed in video form. Based on these characteristics, the development of learning media using social media technology can make it possible to solve problems during learning. The first stage in developing learning media based on the ADDIE model is the analysis stage.

At the analysis stage, researchers analyze student needs for learning media and analyze the level of students' ability to operate the learning media to be developed. Analysis of the needs and the abilities of students is carried out to find out the urgency of developing Instagram- and TikTok-based learning media in the learning process. This analysis is carried out in the form of filling out questionnaires by students. The questionnaires contain questions related to the development of learning media. The questionnaire respondents—52 students from Senior High School 7 Malang—consisted of two classes, which is class XI Analytical Chemistry 1 and XI Analytical Chemistry 2, with the criteria of having taken the chemistry lesson for qualitative analysis of cation class I and II. The needs analysis questionnaire can be seen in Table 3.

Table 3.
Student Needs Analysis Questionnaire

No.	Statement	Percentage Answer
1	Types of learning applied in schools	Online: 60%. Blended learning: 40%.
2	Preferred type of learning	Blended learning: 52%
3	Does your chemistry teacher use social media to deliver the material?	Yes: 100%
4	Identify a platform that is usually used by chemistry teachers to carry out online learning.	Google Classroom: 29% Zoom: 2% Microsoft PPT: 81% Printed books: 70% LKPD: 31% WhatsApp: 92%
5	Are you an active user of your social media?	Yes: 100%
6	Do you understand how to use social media?	Yes: 100%
7	In a day, how long do you use social media?	5–6 hours: 61%
8	What social media do you use frequently?	Instagram: 94% TikTok: 94%
9	What is your purpose for using social media?	Entertainment: 94% Fill your free time: 83% Sources of information: 54% Education: 65%
10	Can social media be used as a learning medium?	Can be: 52%
11	Is social media-based learning media needed by students?	Urgently needed: 51%
12	In your opinion, what social media platforms can be utilized as a chemistry learning medium?	Instagram: 84% TikTok: 94% YouTube: 88%
13	Is social media-based learning media needed by students?	Urgently needed: 51%
14	How often do chemistry teachers give explanations related to chemical processes at the submicroscopic level (which cannot be observed by the eye directly)?	Quite often: 52%
15	How often does your chemistry teacher explain chemistry in the context of everyday life?	Quite often: 75%
16	How often does your chemistry teacher use chemistry symbols when explaining lessons?	Quite often: 56%

Based on the student needs analyzed in Table 3, online system learning at school was applied 60%, and 40% was implemented in a blended learning method. For two years, from 2020–2022, students experienced various deep adjustments to the learning process because of the presence of the COVID-19 pandemic, requiring online implementation of learning for schools. The blended learning method was preferred by students (52%). For online learning and blended learning, utilizing technology became integral for the teacher to control. Media learning holds much potential with digital technology (Saraswati & Mertayasa, 2020).

The era of the Industrial Revolution 4.0 requires everyone to be proficient in using technology (Retnaningsih, 2019). The world of education during the pandemic and post-pandemic requires technology to support online learning activities. According to the Herdiati et al. (2021) needs analysis questionnaire, chemistry teachers have implemented social media in delivering material in schools. The most widely used learning media by

teachers are WhatsApp, Microsoft PowerPoint, and Google Classroom, while other printed learning media used are LKPD and printed books. Based on research by Asrori et al. (2021), at Senior High School 7 Malang it is known that student learning resources that contain interesting images or videos can help students to understand the material and the learning atmosphere—and it is not boring. One vessel that can be used as a learning medium containing images or videos is social media.

Chemistry teachers at Senior High School 07 Malang have not taken advantage of social media, which has high user interest. Meanwhile, all students who fill out the analysis questionnaire are active users of social media. The most frequently used social media are Instagram, TikTok, WhatsApp, and YouTube. As many as 61% of students use social media for 5–6 hours a day. The number of students who use social media as entertainment is 94%, 83% use it to fill their free time, 65% use it for education purposes only, and 54% of students use it only as a source of information.

Based on the analysis of students' abilities, it is known that in 2020 there has been no innovation in online learning, along with adjustments to the use of technology, especially social media. This is reinforced by the results of research by Asrori et al. (2021) from Senior High School 7 Malang, showing that students need updated teaching materials that can contain videos. The use of social media as a learning medium can help overcome these problems. The use of social media by students is classified as "high intensity," while the use of social media as a learning medium is still limited to the WhatsApp application. In this condition, it is certainly necessary to develop piracy media by utilizing social media that has more up-to-date features. Based on the questionnaire analysis of student abilities, 52% of students answered that social media can be used as a learning medium. As many as 51% of students really *need* social media-based learning media. Students heavily engage in social media, with 84% of students using Instagram and 94% using TikTok, because they have almost the same characteristics.

The Instagram- and TikTok-based learning media products developed prioritize the overall utilization of the "reels" feature in the form of short-form videos. There are also some infographics for additional information and are used as an apperception. Learning media in the form of "feeds" and video reels, according to chemistry teachers, can attract learning interest for students, with additional information to present problems or readings to open up students' initial knowledge. According to Zainuddin (2018), the current trend in collaborating technology in education is an inverse classroom model that changes the learning process.

The learning process using social media can accelerate the adaptation of technology in the world of education by applying it to online and blended learning. During the learning process, as many as 52% of students answered the teacher often, gave explanations related to chemical processes at the submicroscopic level, and as many as 56% answered teachers often using symbols when explaining a chemical process at the time of learning. Based on these data, the development of learning media carried out needs to use a multi-representational approach, including three levels of representation given to students for explanations related to chemical processes. In terms of applying chemistry in daily life, as many as 75% of students preferred teachers to frequently explain chemistry material with the context of daily life. The availability of internet data at Senior High School 7 Malang is adequate for students to access the internet. Students bring mobile phones to school daily for the benefit of studying at school. Students are allowed to use mobile phones at school during class hours, with the permission of the teacher, so that the development of social media-based learning media has the opportunity to be carried out in schools, because the facilities provided by schools is adequate and there is an ease of access to developed learning media.

At the design stage, researchers prepare several things that are needed, such as software to create content, qualitative analysis materials for class I and II cations, preparation of content tables, and preparation of material, like expert-validated sheets and media. The preparation of material that will be included in the learning content is sourced from Vogel's book (Jeffery, 2022). The learning topics taken are limited to qualitative analysis of group I and II cations. The material that has been compiled is then added to the content table which is used as a reference for creating learning content. The design stage begins with the preparation of material to be made in the form of infographics

and videos. The preparation of the validation sheet and the assessment rubric are consulted with the supervisor. The resulting learning media product is in the form of video reels, in addition to several infographics as a complement, which have added captions to be uploaded on the Instagram and TikTok applications.

The next stage in the ADDIE development model is development. The stage in developing Instagram- and TikTok-based learning media is to create an account for learning. The development stage in the ADDIE model is the product manufacturing process. At this stage, a dedicated social media account was created both on Instagram and TikTok, with the usernames @Kimiafun for TikTok and @Kimiafun2022 for Instagram. The bio of the account contained a brief description of the Kimiafun account. At the development stage, the product is developed by creating learning content according to the content table that has been designed, with the number of learning content videos as many as 23, and 14 infographics. In general, the content contains a summary of the material, that has been packaged attractively. The following Kimiafun Instagram and TikTok accounts can be seen in Figures 2 and 3.

The next step is to validate learning media. Validation is the process of assessing learning media before it is tested on students. There are two types of validation carried out: material validation and media validation. The validation stage is carried out by one material expert lecturer, one media expert lecturer, and one vocational school teacher in chemistry subjects. Data presented is from the validation of the development of Instagram- and

Figure 2.
Kimiafun Instagram Account

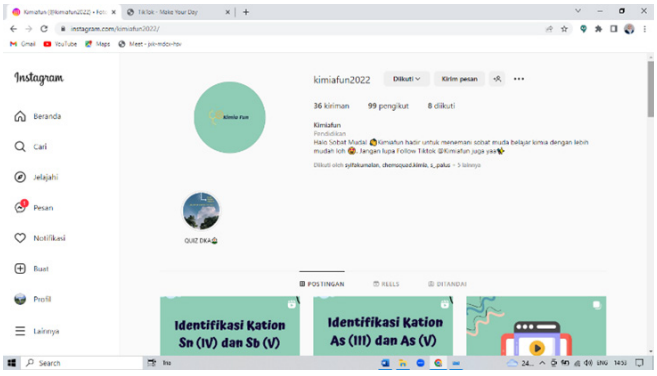
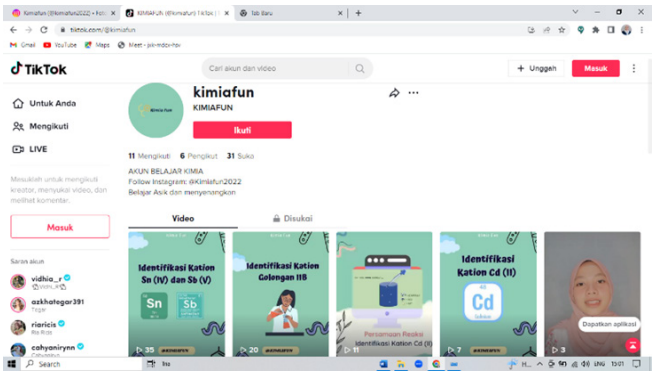


Figure 3.
Kimiafun TikTok Account



TikTok-based learning media in the material of qualitative analysis of group I and II cations with a multi-representational approach in the form of quantitative data and qualitative data. Quantitative data are presented on the Likert scale, while qualitative data takes the form of suggestions from validators. The validation carried out by material experts is related to content aspects like language feasibility, truth to material, and the usability of Instagram and TikTok. Media aspects include general display, image display, and writing display. In summary, a recapitulation of validation values is presented in Table 4.

Table 4.
Recapitulation of Media Validation Results

No.	Assessed Aspects	Percentage Score	Criterion
1	Main View	88%	Very worthy
2	Image Display	89%	Very worthy
3	Writing Display	86%	Very worthy
4	Instagram and TikTok account can be used in learning qualitative analysis of group I and II cations with a multi-representational approach	73%	Proper
Average Media Validation Results		84%	Very worthy

Table 5.
Comments of the Media Validation

Validators	Comments or Suggestions
VI	-
V2	• Still can't be said to be multi representational because it only plays with text; a little animation and diagrams in the form of an infographic should be added. When the infographic appears, the presenter is just a voice. Don't always be a presenter who performs constantly.
V3	• In general, the presentation of learning media with Instagram is already interesting. But there are some things that can still be maximized. • The chemical representation approach has already appeared on Instagram media. But is it possible to add one more video that illustrates the process of color change in the deposit? Because the real micro aspect is explaining how the compound reacts; what is shown in the video focuses on the symbol and reaction result. Concrete suggestion: make one animated video depicting the process of chemical reactions between compounds that produce discoloration or precipitate. (Only show an illustration with the narrator's voice, without the narrator's image. Students will focus more on seeing the reaction process and decrying the narrator's explanation.)

Table 6.
Material Validation Results

No.	Assessed Aspects	Percentage Score	Criterion
1	Eligibility of Contents	82%	Very worthy
2	Linguistic Eligibility	76%	Proper
3	The truth of the material approach: qualitative analysis of group I and II cations on learning video content on Instagram	90%	Very worthy
4	Instagram and TikTok are suitable for use in learning material on qualitative analysis of class I and II cations	90%	Proper
Average Material Validation Results	w	84%	Very worthy

Table 7.
Comments of the Material Validation

Validators	Comments or Suggestions
V1	-
V2	• The background sound is reduced so that the source's voice is more clearly heard. • There are videos that pause for too long, so they are not good enough. • There is improper use of extraction terms. • The image of group I elements displayed is too large and lacks aesthetics. • The group separation material is further strengthened and packaged attractively, but dense because it is limited by the time duration of the TikTok video.

In terms of the feasibility of media display with 13 indicators, an average validation result of 84% was obtained and included in the criteria that are very feasible to use. In the aspects of suitability of text placement, image size, and clarity of writing get a lower value than other assessment indicators; this is because learning content in videos are recorded in portrait orientation so that the space to add images, writing, or other infographics is limited. Learning content videos are made

using a multi-representational approach so that in one video the learning content must have three chemical representations. Therefore, for the size of the image, the placement of content cannot be maximized, especially the molecular images of chemical compounds as well as the reaction equations added in the video, which causes poor clarity of the writing.

Based on the data from the material validation results in Tables 6 and 7, the learning content on Instagram and TikTok have been compiled and declared very feasible in material validation. But there are some comments and suggestions given by validators which are then used to revise the content of learning media on Instagram. There are 12 assessment indicators on content validation, but some indicators get lower scores, such as grammar accuracy, language accuracy, and term accuracy. This is because there is a lack of language and terms spoken by the creator in accordance with the suggestions and input provided by the validator. The term is the use of the word "extraction" that does not correspond to the material of qualitative analysis of cations, supposedly using the word "separating" or "separation" so that the value on the indicator is lower. The grammatical standards did not get maximum results because the videos made were approached using semi-formal language, so they were easier to enjoy by the audience.

The target audience of the learning video made is teenagers 15–18 years old. Therefore, creators do not use standard language but more flexible language. In the aspect of language suitability, validators suggested the teachers provide prompts to continue watching other learning videos or other positive engagement to make learning videos more interactive. In terms of material, material experts have validated an overall value of 84.5%, therefore including it in the "very feasible" category. The solicitations to follow Kimiafun's social media account can be seen in Figure 5.

Based on suggestions from validators, several improvements were made to the appearance of Instagram- and TikTok-based learning media so they were more suitable for use. Product improvement results based on validation results are presented in Figure 6. The results of media validation provided input to add an animated video that describes the process of chemical reactions between compounds that produce color changes or deposits. Based on the input, several animated videos were made about the chemical reaction process in each separation of group I and II cations. Due to the existence of this animated video, it is expected that students will focus more on observing the process of chemical changes that occur in three chemical representations. This animated video also answers students' learning obstacles regarding the difficulty of understanding chemical reaction processes and chemical equations in cation separation.

The next suggestion is about the size of the group I cation symbol, which is too large. In the video the cation symbol looks large because the white background on the writing makes the size look large; but when the white background is removed, the cation writing does not look clear. This issue can be improved by reducing the size of the cation writing. The material validator advised lowering the background music volume so the information from the narrator can be conveyed clearly. At first, the volume of the background sound was 20% and then lowered to 12%. The corrected learning content is then reuploaded according to the order in the content table design, both on Instagram and TikTok. Based on

Figure 5.
Solicitations to Follow a Chemistry Account

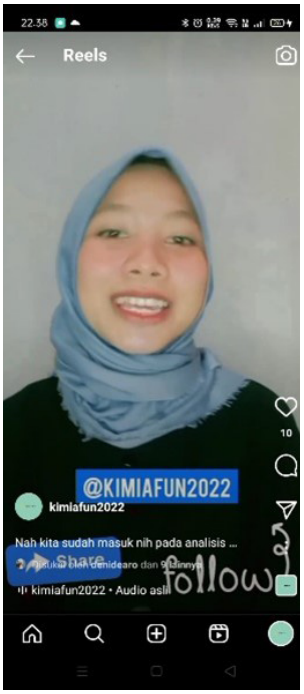
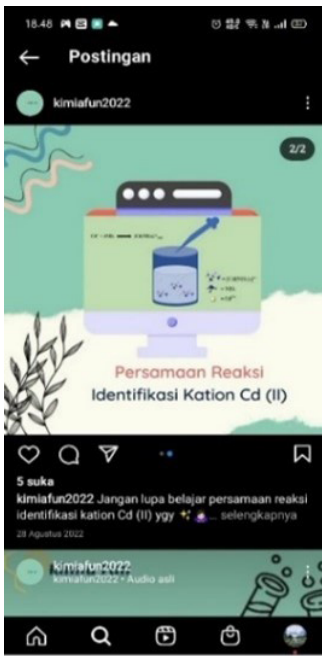
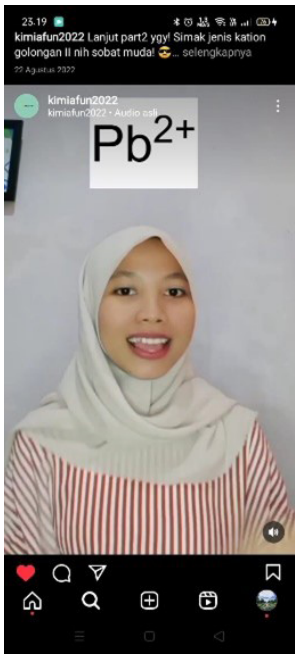


Figure 6.
Animation of Chemical Reaction Processes with a Multi-Representational Approach



validation assessments conducted by material and media experts, and after several improvements and additional content, overall Instagram- and TikTok-based learning media on qualitative analysis materials for class I and II cations using a multi-representational approach are very feasible for use in schools. The results of the improvements can be seen in Figure 7.

Figure 7.
Group I Cations



In the next stage, a trial of Instagram and TikTok learning content development products on qualitative analysis material for group I and II cations with a multi-representational approach was carried out. Product trials were conducted to see the value of students' responses to learning media. At this stage, the subject of the study was students who have received qualitative analysis material for class I and II cations. Students were asked to visit Kimiafun's social media accounts and watch the learning content presented in sequence, after which students filled out the learning media readability questionnaire. There were several assessment indicators filled out by students. The following is a recap of the results of the student-response questionnaire that has been processed using the Linkert scale presented in Table 8.

Table 8.
Results of Student Response Questionnaires

No.	Assessed Aspects	Percentage Score	Criterion
1	Media readability	80%	Excellent
2	Instagram and TikTok content on qualitative analysis materials for class I and II cations can motivate me to learn.	79%	Can motivate to learn
3	I can use Instagram and TikTok content on the qualitative analysis material of group I and II cations independently.	79%	Can be used independently
4	I can access Instagram and TikTok content on the qualitative analysis material of class I and II cations without being limited by space and time.	80%	Accessible without limited space and time
5	I can use Instagram and TikTok content on the qualitative analysis material of class I and II cations.	83%	Very easy to use
6	Instagram content on qualitative analysis materials of class I and II cations can attract my learning interest.	83%	Very interesting interest in learning
Average Results of Student Response		81%	Excellent

The final results of the student response questionnaire conducted at Senior High School 7 Malang on 52 students of class XI Analytical Chemistry 1 and 2 obtained "excellent" perceptions of Instagram and TikTok learning media. Before conducting a readability test, the learning media had been validated by media and material experts and obtained results that were "very worthy" of trial. When reviewed as a whole in terms of the appearance of learning media, it got a score

of 81%, because the learning media presents an attractive general appearance, easy-to-understand language, appropriate text shape and size, clear image shape, and suitability of writing the correct title. Several assessment indicators that received a lower percentage are text placement, image size, and image variations that are not optimal due to limited space in learning content videos. Instagram and TikTok learning media present an interesting combination of images, audio, and videos. Based on the readability questionnaire, Instagram- and TikTok-based learning media can help students learn independently, with a percentage of 79%. This is supported by the ease of accessing learning media without being limited by space and time, with a percentage of 80%.

Regarding the ease of using learning media, 83% considered Instagram and TikTok "very easy to use" because the learning media developed is based on social media, where all students are active users. Using learning media to increase students' interest in learning scored a percentage of 83%, rating "excellent" in increasing interest in learning. This is supported by comments and suggestions from students through the readability questionnaire, confirming that Instagram- and TikTok-based learning media are very interesting when coupled with explanations interspersed with songs—assisting understanding and engagement with readers who have auditory properties. Learning with digital methods is fun. This positive response is likely because schools previously had never used Instagram- and TikTok-based learning media, therefore students felt new experiences in learning activities.

The next step is to review suggestions from the results of the trial on students. There are several suggestions that have been given to improve Instagram- and TikTok-based learning media, including extending the time limit for the duration of videos set by Instagram and TikTok. In terms of images and writing, learning media should use more animated variations. Students also suggested displaying more interesting features so that peers are happier to follow the learning. Based on these inputs, improvements were made by creating story content containing brief information as a reminder of the qualitative analysis material of class I and II cations as well as daily quizzes for students who have been highlighted, so that they can be accessed again by students.

CONCLUSION

Based on the research and development that has been carried out, learning media based on Instagram and TikTok on qualitative analysis materials for class I and II cations using a multi-representational approach, that has been tested for feasibility by experts, can be produced. The validation value and readability test questionnaire obtained very feasible learning media results in the general display aspect, receiving percentage of 84%; presenting the material obtained 84%, including the "very worthy" category; and in the results of the questionnaire, the response of students was classified as "very good," with a percentage of 81%. Based on these three aspects, Instagram- and TikTok-based learning media are very worthy of being used as chemistry learning media and can be used as an alternative in order to increase student motivation and interest in learning. The response from students shows that Instagram- and TikTok-based learning media are very interesting as a result of explanations being interspersed with songs, which engages and aids readers who have auditory properties in understanding what is explained—plus, learning with digital methods is fun and cool.

Based on the limitations of the research developed, learning media can be applied using various variations of learning models, and the effectiveness of the use of Instagram- and TikTok-based learning media in the qualitative analysis material cations with a multi-representational approach can be measured. This learning media can also progress by creating learning content that contains different material.

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