

## **Development of Interactive Learning Media using Autoplay Media Studio 8 for Colloidal Chemistry Material**

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**Abstract.** Chemistry is to study the concepts which are mostly abstract. One of them is in colloidal material. The abstract concepts are difficult to understand if only explained in two-dimensional form. Therefore, a media is needed to visualize the abstract concepts of colloidal material both in terms of both macroscopic and microscopic. This study aims to develop an interactive learning media using Autoplay Media Studio 8 that is worthy of being used as a learning media. The study used the Research and Development (R & D) method which referred to the Borg and Gall model. Data collection techniques were in the form of validation sheets and response questionnaires (teachers and students). The data analysis technique used descriptive statistical analysis. The results show that the percentage score obtained from five experts (two media experts and three material experts) gained 96.74% with very valid categories. The results of trials for teachers and students each obtained an average percentage score of 87% and 92% with very practical categories. Based on the results of the study, it can be concluded that interactive learning media using Autoplay Media Studio 8 on chemistry subjects of colloid material in class XI SMA/MA are appropriate to be used as learning media.

**Keyword:** *Autoplay Media Studio 8, Colloid, Development, Interactive Learning*

### **1. Introduction**

Learning innovation needs to be developed and implemented in order to prepare teachers who are ready to act as educators and researchers to face the challenges of the 21st century (Hendripides, 2018). The 21st century is a century of knowledge characterized by the rapid development of technology, information and communication. The characteristics of the 21st century include the availability of information anywhere and anytime and

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the implementation of machine usage that is able to reach all routine work that can be done anywhere and anytime.

The need for mastery and application of science and technology in order to face global demands has an impact on the increasing role of ITC (Information and Communication Technology) in various aspects of life, including in the education sector (Ministry of National Education, 2010). The development of ICT has the potential to change the way a person learns and obtains information and provides opportunities for teachers to develop instructional techniques to get maximum results (Roza et al., 2017). Referring to this new development, chemistry teachers need to have a strategy to make chemical teaching and learning activities more creative, innovative, responsive, constructive, and conducive comprehensively. This idea is to improve the quality of teaching and learning chemistry in line with the development of 21st century education transformation in creating superior chemistry teachers in Indonesia (Copriady, 2015).

Kemendikbud (2013) stated that the 21st century requires a transformation of education as a whole in order to improve the quality of teachers. These efforts are able to advance the knowledge, training and achievements of the students. Teacher need to follow developments and master ITC skills in the learning process. One effort that needs to be done is to use a media in learning activities. The use of ITC can be an effective alternative to develop a learning media as a tool in the teaching and learning process. Learning media is everything that can be used to stimulate thoughts, feelings, attention and abilities or skills of students so that it can encourage the occurrence of effective learning processes (Arsyad, 2011).

The role of ITC-based learning media in the learning process can save time, increase activity and enhance students' memory (Sadiman et al., 2011). The use of ITC-based learning media also can overcome the obstacles that often occur in the teaching and learning process such as the limitations of classroom learning hours, saturation during the learning process and the complexity in delivering abstract material (Djamarah, 2005).

The uses of learning media are able to stimulate arouse interest and motivation and bring psychological effects to students. However, variations in learning, especially the use of learning media that actively involve students, are rarely performed (Arsyad, 2011). For this reason, it is necessary to develop an interactive learning media that are well designed and developed so that students can be active in the learning process. Besides that the role of the teacher in the teaching and learning process can be played by the media even without the existence of the teacher.

Colloid is one of the materials on the chemistry subjects in senior high school. Colloidal is a material that contains abstract concepts and requires

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visualization to understand them such as in the submersible types of colloids (soles, emulsions, froths, and aerosols) and submersible properties of colloids (Tyndall effects, brown motion, adsorption, coagulation, dialysis, electrophoresis and protective colloids). This situation makes the students less interested in learning it. The students also cannot understand the colloidal material optimally because they only listen to the teacher's explanations who still cannot provide a clear picture to students about abstract concepts or microscopic aspects. As the result, the student knowledge is still limited to its macroscopic aspects (Setiawati, 2013). Yet to be able to understand a concept intact, students must be able to understand the concept both from the macroscopic and microscopic level (Kean, E. and Midlecamp, C., 1985). Characteristics of abstract material will be more easily understood if it is associated with daily experience and visualized in learning (Gusmida, 2017). Therefore we need a tool to visualize or to illustrate the abstract concepts both in terms of macroscopic and microscopic. The way to do it is ICT-based learning media that can be used to convey learning information to students accurately, clearly and also give an interesting and stimulating to students in teaching (Sadiman et al., 2011). The design of ICT-based interactive learning media aims to clarify the presentation of messages and information and can overcome sensory limitations, space, time, and objects and objects that are too large or too small that are not visible to the senses that can be presented with the help of films, slides, videos, animations or picture (Trianto, 2010).

The use of the elements in the form of text, graphics, images, photos, audio, video and animation on ICT-based learning media can describe the chemical concept of colloidal material which includes both aspects of the study (macroscopic and microscopic) so that students can have complete mastery of concepts. The complexity of the material delivered to the students can be simplified and the abstractness of the material can be visualized in the presence of media (Sadiman et al., 2011).

ICT-based interactive learning media can be developed using software. One of the software that can be used is Autoplay Media Studio 8. The Autoplay Media Studio 8 program is an interactive learning media that can invite students to get involved and interact directly with learning media and can arouse student motivation and interest in the learning. This is because Autoplay Media Studio 8 is an application that can combine both writing, image, sound, animation, video, flash, shape and has a button that can be connected anywhere to open files both online and offline such as opening a website, Microsoft Word, Microsoft Exel, Microsoft Powerpoint, pdf, html and others. This Autoplay Media Studio 8 application-based learning media is an application that is relatively easy in its manufacture and use (Nisa et al., 2017). Autoplay Media Studio is also widely used because it has good quality learning media (Alfan, 2015). A research related to the development of interactive learning media based on Autoplay Media Studio 8 was

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conducted by Shubhi et al. (2015) with the acquisition of media by experts with validation scores of 88.16% and material validation of 90.68% so that the overall results of media validation fall into a very valid category. The acquisition of test scores of small group students was 85.62% and tests of large group students were 87.06% with valid categories. This shows that the learning media developed are worthy of being used as learning media.

Research on the development of ICT-based learning media is an interesting thing and needs to be developed now especially in the field of education. In this paper, we will discuss the research on the development of interactive learning media based on Autoplay Media Studio 8 on chemistry subjects in colloidal matter in class XI SMA / MA that are worthy of being used as learning media.

## 2. Methodology

This study used the Research and Development (R & D) method which refers to the Borg and Gall model. According to Borg and Gall, "educational research and development is a process that is used to develop and validate educational production", which means that education research and development is a process to develop and validate educational products. With this understanding, the series of steps of research and development are carried out cyclically, and at each step that will be carried out always refers to the results of the previous steps until finally a new educational product is obtained. The steps for developing the Borg and Gall models are: 1) Introduction and information gathering, 2) Planning, 3) Initial product development, 4) Initial field testing, 5) Initial product revision, 6) Main field trial, 7) Revision of trial products, 8) Trial implementation / usage, 9) Revision of the final product, 10) Dissemination and implementation (Mulyatiningsih, 2014). However in this research was limited to the seventh stage because it was constrained by the time and research needs. The flow chart of the development derived from Borg and Gall can be seen in Figure 1.

This development research was carried out at the Postgraduate Program in Chemical Education FKIP University of Riau and the limited test has been done at SMA N 1 Tapung. The research subjects consisted of 5 validators which are 2 media experts who work as lecturers in Riau University and UIN Suska Riau. They are competent in the field of learning media. The other are 3 content experts who work as lecturer of University of Riau. They are competent in the field of chemical materials. The other validators are 3 chemistry teachers and 15 students at SMAN 1 Tapung.

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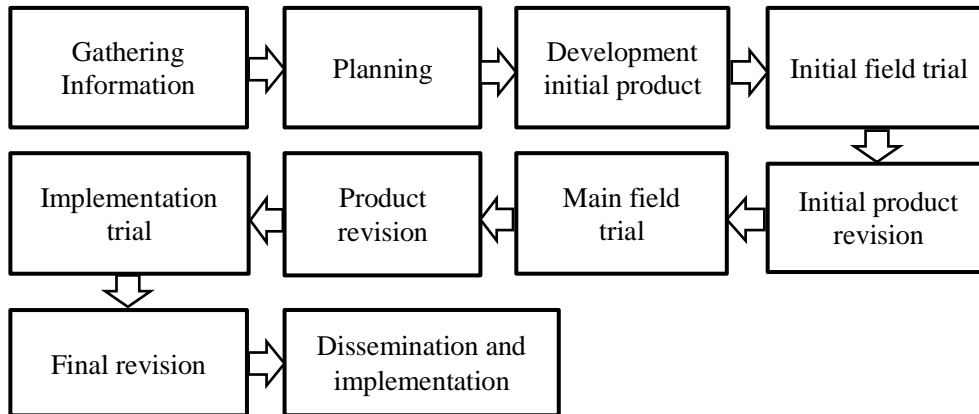


Figure 1. The flowchart of development procedure by Borg and Gall

Data collection techniques used the validation sheets and response questionnaires (for teachers and students)). Validation sheet was as a measurement tool for assessing the feasibility of media. The questionnaires are as a tool to measure the practicality of the media. Validation sheets and teacher response questionnaires are arranged based on the Likert scale with a score of 1-5. The following Likert scale for the assessment categories are shown in Table 1 (Sugiyono, 2013).

Table 1. The assessment categories of *Likert* scale

Assessment Score	Remark
5	SS : Very agree
4	S : Agree
3	KS : Fairly Agree
2	TS : Not agree
1	STS : VERY Not agree

The questionnaire for students are arranged based on the Guttman scale which consists of two answer choices "Yes" worth 1 or "No" worth zero. The Guttman scale assessment category according to Arikunto (2010) can be seen in table 2.

Table 2. The *Guttman scale*

Score	Remarks
1	Yes
0	No

The collected data has been analyzed using descriptive statistical analysis techniques descriptively. The data obtained was processed through numbers in the form of descriptive percentages. The formula used to calculate the percentage according to Ali (2009) is as following formula:

$$P = \frac{f}{N} \times 100\%$$

Where: P is score percentage (%), N is number of maximum score, f is the obtained score.

Decision making about the quality of media were referred according to Riduwan (2012) that is presented in Table 3.

Table 3. Level of Validity and Practical Category

Percentage	Validity Level	Category
81–100	Very Valid	Very Good / Very Practical
61–80	Valid	Good / Practical
41–60	Less Valid	Pretty Good / Pretty Practical
21–40	Invalid	Less Good / Less Practical
< 20	Very invalid	Very Bad / Very Not Practical

### 3. Results and Discussion

This research and development generated a product in the form of interactive learning media based on Autoplay Media Studio 8 on chemistry subjects of colloidal material that had been tested for the validity and practicality. This development procedure is carried out in reference to the Borg and Gall model with details of the following steps:

#### *Preliminary Research and Information Collection*

This stage is a needs analysis that consists of literature studies and field studies. In the literature study, syllabus analysis was conducted as a review of Core Competencies (KI) and Basic Competencies (KD) set in the 2013 curriculum. In addition, literature studies were conducted to collect reference data and literature related to media development research through various sources of books, journals, articles and internet media. The results found that colloidal material is one of material that contains abstract concepts that cover the aspects of the study both macroscopically and microscopically so that students are less interested in learning. Therefore a tool is needed that can describe the abstract concept of colloidal material both in terms of macroscopic and microscopic so that students can be interested in studying it.

Furthermore, the field studies were carried out by conducting pre-research directly at SMAN 1 Tapung by conducting analysis in the form of observations and interviews with chemistry teachers to analyze the characteristics of students which included basic knowledge of chemistry possessed, how students behave towards colloidal material, and the level of cognitive development of students because the making of learning media products must be adapted to the cognitive development of students. In

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addition, interviews were conducted about the methods or media used by the teacher in the learning process. The results obtained that the teacher has used Powerpoint media (PPT), but in the application of slides that are given by the teacher through Powpointpoint media are only able to assist teachers in facilitating the delivery of material. The absence of variations in the use of learning media such as the absence of animations or videos that are displayed so that in terms of attractiveness and novelty of the media used so far has not been able to make chemistry subjects interesting and easy to understand so students are less optimal in concretizing chemical material that is abstract. Therefore, based on the problems that exist in the literature study and field studies, the development of learning media is carried out that can visualize an abstract colloidal material, one of which is interactive learning media based on Autoplay Media Studio 8.

### ***Planning***

At the planning stage, the determination of indicators and learning objectives to be achieved in colloidal material is carried out. Furthermore, collecting various supporting materials for making media such as collecting literature that supports the material, collecting images, audio, video, animation and flash are appropriate and related to colloidal material.

### ***Early Product Development***

At this stage the initial product (draft I) of interactive learning media is produced based on Autoplay Media Studio 8. The steps are: (1) Creating Storyboard as a reference frame in developing ICT-based learning resources in the form of a sequence of learning resources. The components that must be in the storyboard include the display sequence, Display Material, Description, Navigation and Layout / display design, (2) Conducting learning media according to material characteristics for 3 meetings based on competency indicators in accordance with 2013 Curriculum and equipped with drawings, audio, video, animation and flash that support the material, (3) Creating research instruments in the form of validation sheets along with their descriptions and response questionnaires (teachers and students). Validation sheet is used to determine the feasibility of interactive media based on the assessment of material experts and media experts while the questionnaire responses are given to teachers and students to determine the practicality quality of learning media. Figure 2, Figure 3 and Figure 4 are the display of several interactive media pages based on Autoplay Media Studio 8 on colloidal material.

### ***Initial Field Trials***

At this stage the initial product validation (draft I) is done through a validation sheet by 2 media experts and 3 material experts to determine the feasibility of the product being developed. Each validator assesses the

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media in accordance with aspects of media assessment based on the Ministry of Education's Guide to ICT-Based Teaching Material Development (2010) directorate of high school development which consists of 4 aspects namely substance content aspects, learning design aspects, display aspects (visual communication) and software utilization aspects . The substance aspect of the content contained 7 items of assessment, aspects of learning design contained 10 points of assessment, aspects of the display (visual communication) contained 10 points of assessment and aspects of the use of the Software contained 9 points of assessment. The assessment by media experts is focused on the physical form of the media being developed, while the assessment by material experts is focused on the content (material) of the media. The results of the validation assessment obtained from descriptive data in the form of suggestions and input on the initial product (draft I).



Figure 2. Display of work page using Autoplay Media Studio 8



Figure 3. Display of the main page



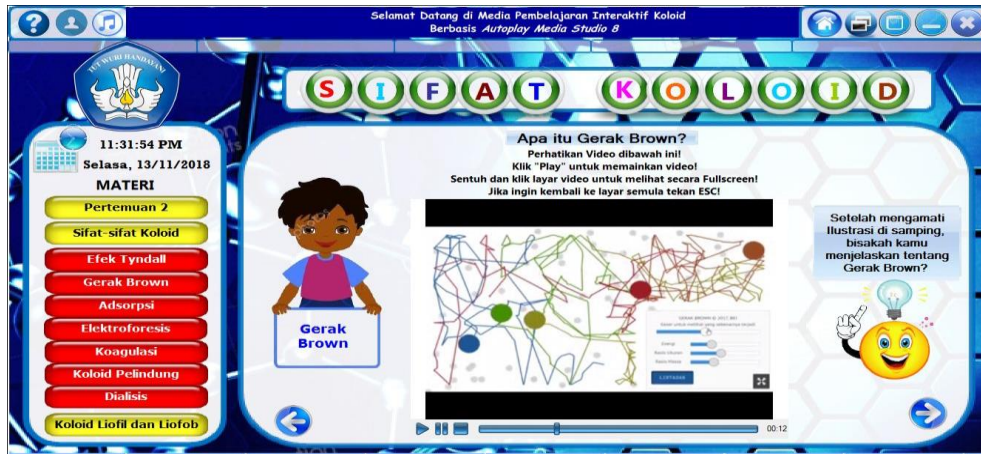


Figure 4. Display of learning material

Table 4 and Table 5 are suggestions and input for improvements from each validator.

Table 4. Suggestions and Feedback on Improvements by Media Experts

Validator	Suggestions
Validator I	<ul style="list-style-type: none"> <li>The opening of introduction is too long</li> <li>The "Next" or "Back" button does not move to another subsection</li> <li>At the beginning of a subsection, the "Back" button should not exist</li> <li>At the last of a subsection, the "Next" button should not exist</li> <li>Almost all information subsections of the day display 00/00/0000</li> <li>Compiler profiles do not need to be animated, just display all data</li> <li>The videos should not "Autoplay" (do not automatically open)</li> </ul>
Validator 2	<ul style="list-style-type: none"> <li>Improve the title: "Chemical Interactive Media Based on Autoplay" Colloidal Material "</li> <li>Fix writing errors in sentences: Autoplay is software for creating software?</li> <li>Font type should not be like a cartoon</li> <li>Cutting the video is not quite right especially at the end of the video</li> <li>Background sound / music on the "Delta Formation" video cannot be turned off</li> </ul>

### ***Initial Product Revision***

At this stage, revision I or improvement of the media is carried out in accordance with the suggestions and input given by material experts and media experts on the initial product (draft I). After the initial product is repaired, a media product is produced (draft II) which is then validated again by each expert. Data obtained from the validation results were analyzed descriptively by percentage. The Figure 5 is a diagram of the results of validation by media experts and material experts for each aspect of the assessment.

Table 5. Suggestions and Feedback on Improvements by Material Experts

Validator	Suggestion
Validator 3	<ul style="list-style-type: none"> <li>• There is a background music that is not appropriate as explained in the delta formation</li> <li>• The narrator's voice is not clear in the apperception of the first meeting and in the matter of condensation and dispersion</li> <li>• Add references to images and videos on the media</li> </ul>
Validator 4	<ul style="list-style-type: none"> <li>• The LKPD at all meetings should not be made in PDF form, but made as simple as possible in the form of slides</li> <li>• Writing letters on the dispersion system is rewritten because the letters are not clear</li> </ul>
Validator 5	<ul style="list-style-type: none"> <li>• In meeting material I: <ul style="list-style-type: none"> <li>- Apperception videos should be sought more suitable</li> <li>- The sentence "Who" in motivation is removed and replaced with the right sentence</li> <li>- Trial video over laping, just select one only</li> <li>- Check typo or sentence writing</li> <li>- In LKPD the sentence "take one example" is replaced with the appropriate sentence</li> </ul> </li> <li>• In meeting material II: <ul style="list-style-type: none"> <li>- Motivation is not right, replaced with the appropriate one</li> <li>- Video adsorption, electrophoresis, dialysis edit better</li> <li>- In protective colloidal material give examples that are close to everyday life (general)</li> </ul> </li> <li>• In meeting material III: <ul style="list-style-type: none"> <li>- In the water purification material, provide the title: "water purification application using alum"</li> </ul> </li> <li>• Fix unclear sounds and images and very small writing on video material making colloids</li> </ul>

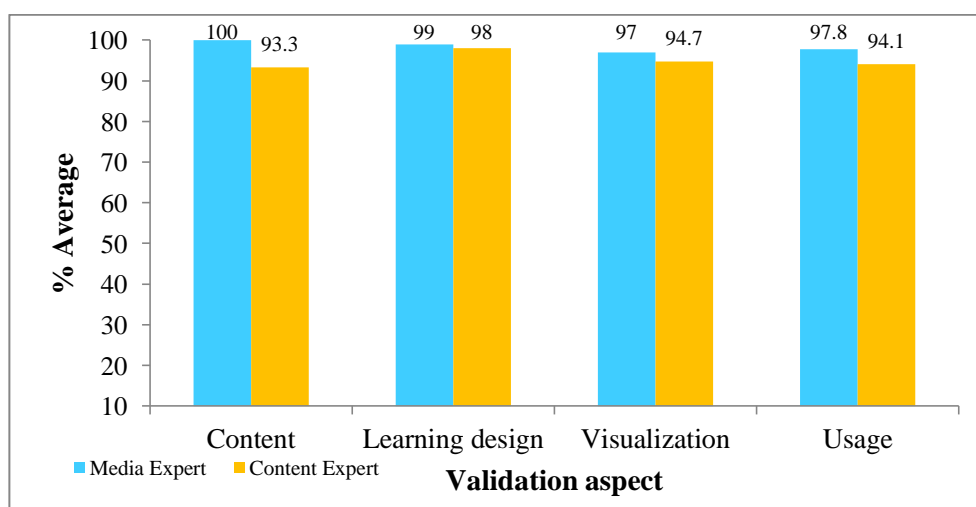


Figure 5. Validation result

Based on the results of media validation presented in Figure 5, the average score of the validity of the content aspect by media experts and material

experts was 100% and 93.3% respectively. While the aspects of learning design by media experts and material experts are 99% and 98%, respectively. The display aspect (visual communication) assessed by media experts and material experts resulting 97% and 94.7% respectively, and software utilization aspects by media experts and material experts were 97.8% and 94.1%, respectively. The average score of validity assessment based on the four aspects of validation assessment by media experts and material experts was obtained at 98.45% and 95.03% respectively. Overall the results of the media validation assessment by five experts (two media experts and three material experts) obtained an average score of validity of 96.74%. Referring to Table 3, the level of media validity lies in the range 81% -100% with a very valid category so that the media can be tested on a limited basis.

### ***Main Field Trial***

At this stage, the draft II of product which have been validated and revised, are then tested on a limited basis (small scale) to 15 students of class XII and 3 teachers at SMAN 1 Tapung. This stage aims to determine the practicality of the media through a questionnaire by teachers and students. The teacher questionnaire consists of 20 items while the student questionnaire consists of 10 questions, where each item is based on aspects of practicality of the media. The data from the trial results are limited to teachers and students in the analyzing and can be seen in Table 6

Table 6. The limited trial result

<b>Respondent</b>	<b>Total Score</b>	<b>Average</b>	<b>Category</b>
Teacher	261	87%	Very Practice
Student	138	92%	Very Practice

Based on the results of limited trials that have been conducted to the teachers and students (Table 6), the average score of the total percentage was obtained of 87% and 92%, respectively. Referring to Table 3, the practicality category of media lies in the range of 81% -100% with a very practical category so that interactive learning media based on Autoplay Media Studio 8 is practical or easy to use in the learning process.

### ***Revision of the main field trial product***

This stage was carried out for the revision II or improvement of media based on the results obtained from teacher and student responses in terms of the quality of media practicality. Overall the responses of teachers and students in terms of the media quality and practicality are good, but it is needed to be improved again for the quality of images and animation on the media. The final product should more attractive so that students are more interested in participating in the learning process. After the media product of

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draft II was improved, the media product draft III was produced that was valid and practical so that it was ready to be tested on a large scale. But in this study the researchers only conducted until the product revision phase only due to the time constrain.

#### 4. Conclusion

Interactive learning media using Autoplay Media Studio 8 on chemistry subjects colloidal material was developed using the Research and Development (R & D) method which refers to the Borg and Gall model. The results showed that the products developed were valid and practical, that are referred to the validation from the expert and practitioners. In general, the interactive learning media that are using Autoplay Media Studio 8 in develop for the colloidal material in class XI of SMA / MA were worthy of being used as learning media to the real learning process.

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