



Interactive Multimedia Development Using Adobe Flash Cs6 to Improve Critical and Creative Thinking Skills of Class VIII Junior High School Students

AP Sundapa¹, S Syamsurizal², Irdawati³, DH Putri⁴

^{1,2,3,4}Department of Biology, Padang State University

ABSTRACT: Education has a huge impact on the existence of the 21st century. Improving the quality of human resources through education, from primary and secondary education to higher education is the key to being able to follow the development of the Industrial Revolution 4.0. This 21st century learning applies creativity, critical thinking, cooperation, problem solving, communication skills, community skills and character. The education system needs a new movement to apply skills in the era of the industrial revolution 4.0. One of the movements designed by the government is the new literacy movement in the form of digital literacy and technology. Interactive multimedia is a new literacy movement based on digital and technology in learning that can improve students' critical and creative thinking skills. The purpose of this research is to produce interactive multimedia for the respiratory system and excretory system material in humans that can improve critical and creative thinking skills of VIII grade students of junior high school.

KEYWORDS: 21st century learning

I. INTRODUCTION

Education has a huge impact on the existence of the 21st century. Improving the quality of human resources through education, starting from primary and secondary education to tertiary institutions is the key to being able to keep up with the development of the Industrial Revolution 4.0. This 21st century learning applies creativity, critical thinking, cooperation, problem solving, communication skills, and community and character skills. Skilled in solving problems means being able to overcome the problems they are facing, in the learning process if students who can solve these problems mean that students can think critically.

Critical and creative thinking skills are two sides that cannot be separated and become educational goals. Both are very important for students to have to increase their knowledge and experience in order to support their lives in the future. Critical thinking skills are forms of thinking that need to be developed by students to be skilled in solving problems, formulating conclusions, collecting, and making decisions^[4]. Creative thinking skills can be interpreted as an individual's ability to give birth to something new and original either in the form of ideas or real work, where the idea is used in solving a problem^[5]. Critical and creative thinking skills really need to be possessed by every student to be able to create and update various innovative new breakthroughs, and can solve problems in everyday life quickly and precisely.

The education system requires a new movement to apply skills in the era of the industrial revolution 4.0. One of the movements designed by the government is the new literacy movement as a reinforcement and even shifting the old literacy movement. The intended new literacy movement focuses on three main literacies, namely 1) digital literacy, 2) technological literacy, and 3) human literacy^[1]. interactive multimedia is a new digital-based literacy movement in learning that allows improve students' critical and creative thinking skills. In general, the benefits that can be obtained through the use of interactive multimedia is a process learning can run more interesting, more interactive, the amount of teaching time can be reduced, the quality of student learning can be improved and the process teaching and learning can be done where and when course, and can improve reasoning skills students^[7].

Interactive multimedia is one of the computer-based learning media or multimedia by utilizing Android. Interactive multimedia is designed using Adobe Flash CS6 software which has the advantage of being able to provide visual stimuli in the form of moving images (animations) that will stimulate students to think critically and creatively. The use of interactive multimedia can be a solution in improving students' critical and creative thinking skills. Utilization of multimedia technology as

an interactive learning method can improve students' critical thinking skills^[3]. The creative thinking ability achieved by students after using interactive multimedia has increased from the low category to the high category^[8].

II. METHODS

The development model used refers to the Plomp development model. The Plomp model consists of three stages, as follows Preliminary Research, Prototyping Phase, and Assessment Phase. The evaluation method used in the Plomp model research is in accordance with the image below:

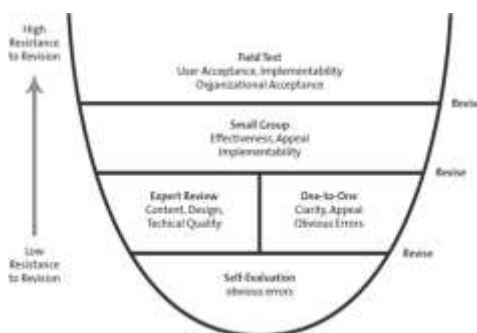


Figure 1. Formative Evaluation Layer

This paper describes the first step in this research, namely the initial investigation stage consisting of problem and needs analysis, curriculum analysis, concept analysis, learning media analysis, and student analysis. the second stage of prototype development consisting of self evaluation, expert review, one to one evaluation, small group evaluation, the third stage of the assessment stage.

III. RESULTS AND DISCUSSION

The development of interactive multimedia material on the respiratory system and excretory system in humans uses the Plomp development research model which consists of three stages, namely the preliminary research phase, the development or prototyping phase, and the assessment phase. The results of the research conducted can be explained as follows.

A. Preliminary Research Phase

This stage aims to analyze the problems and needs of schools, teachers and students, and see an overview of the learning media products developed. At this stage the researchers made observations, by giving questionnaires to students and teachers. The analysis carried out is problem analysis, needs analysis, curriculum analysis, concept analysis, student analysis and learning media analysis. The following is a description of the results of the analysis.

1. Problem analysis

Based on the results of the questionnaire analysis given to the teacher, it is known that the teacher has never measured the critical and creative thinking skills of students. The limitations of learning media are the cause of the difficulty in empowering students' critical and creative thinking skills. Based on the results of the analysis of the questionnaire given to the students, it was stated that the material on the respiratory system and the excretory system in humans is quite difficult and the learning resources in schools are considered unattractive. The following are the results of the questionnaire regarding the level of difficulty of the science material for Class VIII semester II.

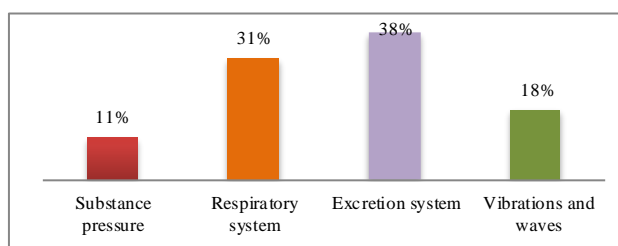


Figure 2. Results of Student Observation Questionnaire

Analysis About the Difficulty of Materials by Students

Based on the results of the problem analysis questionnaire, students need interesting learning resources and are equipped with illustrations so that they can improve students' critical and creative thinking skills.

2. needs analysis

The results of the questionnaire analysis from teachers and students revealed that students need learning resources that can help and hone critical and creative thinking skills. Students need new learning resources, namely interactive learning media with animation, stimulation, and evaluation questions that can train students' thinking skills. Following are the results of the questionnaire on student needs.

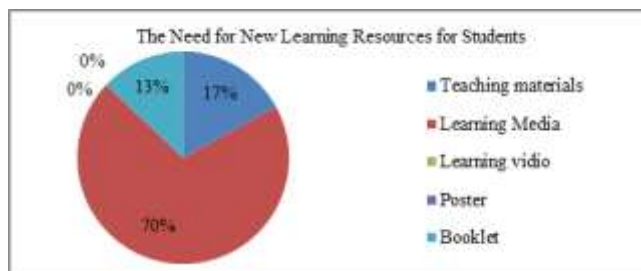


Figure 3. Learning Resources Needs of Students.

Based on the diagram above, it shows the highest point, with a score of 70%, meaning that students need interactive learning media as a source of student learning to help train students' critical and creative thinking skills. From the above analysis, interactive multimedia will be developed to improve students' critical and creative thinking skills.

3. Curriculum Analysis

Curriculum analysis aims as a guide in the preparation of interactive multimedia designed. The subject matter of the respiratory system and the excretory system in humans for the Junior High School level Class VIII curriculum 2013 revision 2017 has basic competencies (KD) which were developed into indicators of competency achievement.

Table 1. Basic Competencies and Indicators of Competency Achievement.

Basic Competencies	Indicators Of Competence Achievement
3.9. Analyzing the respiratory system in humans and understanding disorders of the respiratory system, as well as efforts to maintain a healthy respiratory system.	3.9.1 Explain the meaning of breathing and respiration. 3.9.2 Name the organs that make up the respiratory system in humans. 3.9.3 Investigating respiratory rate in humans. 3.9.4 Analyzing the factors that affect the respiratory rate in humans. 3.9.5 Analyzing the relationship between the structure and function of the human respiratory organs. 3.9.6 Identify the mechanisms of chest breathing and abdominal breathing. 3.9.7 Measuring various respiratory volumes in humans. 3.9.8 Explain the various disorders of the human respiratory system, prevention and control efforts. 3.9.9 Analyze the impact of air pollution on the health of the respiratory system in humans.
3.10. Analyze the excretory system in humans and understand disorders of the excretory system in humans, as well as efforts to maintain the health of the human excretory system.	3.10.1 Name the organs that make up the excretory system in humans. 3.10.2 Describe the function of the excretory system in humans. 3.10.3 Analyzing the relationship between the structure and function of the kidneys. 3.10.4 Analyzing the relationship between structure and function in the lungs.



	<p>3.10.5 Analyzing the relationship between the structure and function of the liver.</p> <p>3.10.6 Analyzing the relationship between the structure and function of the skin organ.</p> <p>3.10.7 Identify disorders and diseases that occur in the excretory system.</p> <p>3.10.8 Identify various lifestyles to maintain a healthy excretory system.</p>
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4. Concept analysis

Concept analysis aims to determine the concepts presented in the material of the digestive and respiratory systems in humans. The results of this concept analysis will be used as the basis for designing LKPD in accordance with Core Competencies (KI), Basic Competencies (KD), and Competency Achievement Indicators. Based on the results of the analysis of the concept of the Human Respiratory System and excretory system Material in full, it is as follows.

Table 2. Human respiratory system and excretory system.

Respiratory system in humans	Excretory system in humans
1. Definition of respiration.	1. Definition of the excretory system in humans.
2. The structure and function of the organs of the human respiratory system.	2. Structure and function of the excretory system in humans.
3. Respiratory rate in humans.	3. Disorders and abnormalities in the excretory system in humans
4. The mechanism of respiration in humans.	
5. Respiratory volume in humans.	
6. Disorders and disorders of the human respiratory system	

5. Student analysis

Student analysis aims to analyze the character of students in the form of learning tendencies, and students' difficulties. The learning process 62% of students tend to learn by seeing and observing and listening to the teacher's explanation directly, according to the picture below:

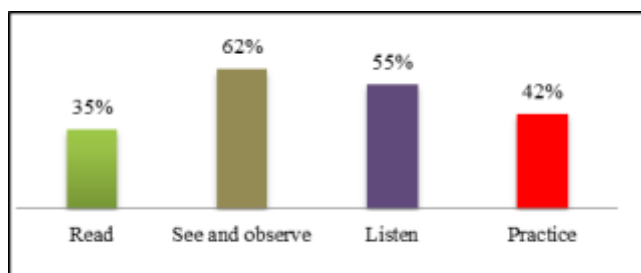


Figure 4. Tendency Questionnaire Result Learn Learners

The difficulties experienced by students in learning to understand the subject matter because 53% of students feel that there are many confusing terms and the material is complicated.

6. Learning Media Analysis

Based on the questionnaire analysis of students' learning media, it is known that the learning media used by teachers have not been able to visualize learning materials and students are less interested in learning. Learning media used by teachers. Here are the results of the analysis Observational Questionnaire about learning media made by teachers who used in schools, as follows. Questionnaire of students' learning media, it is known that the learning media used by teachers have not been able to visualize learning materials and students are less interested in the learning media used by teachers.

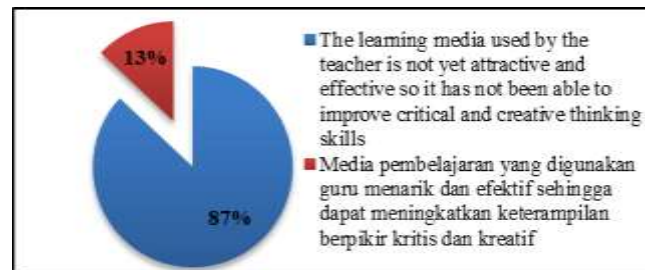


Figure 5. Results of Student Observation Questionnaire

Analysis About Teacher Learning Media.

The picture above shows that 87% of students stated that the learning media has not been packaged attractively and has not been equipped with helpful and relevant illustrations. The criteria for interesting learning media according to students, namely there are animations, stimulation, videos, and evaluation questions so that they can train students' thinking skills.

B. Prototyping Phase

1. Prototype 1 Development Results

The development stage of Prototype I is the stage of designing interactive multimedia, and self-evaluation is carried out by the researcher. Interactive multimedia was developed based on several components, such as content feasibility, presentation, language, and graphics. The prototype development stage I is done by filling out a checklist.

The feasibility of interactive multimedia content developed is in accordance with basic competencies (KD) and competency achievement indicators (IPK) in the 2013 curriculum. Furthermore, the linguistic component of interactive multimedia is in accordance with good and correct Indonesian and communicative so that it is easily understood by students. the presentation component pays attention to the order of sub-materials with IPK, as well as the presentation of multimedia supports such as animations, videos, evaluation questions to measure critical and creative thinking skills. but in the graphic component there is an error regarding the interactive multimedia cover design that is not in accordance with the character of the students. so that researchers improve interactive multimedia before continuing prototype development stage.

2. Prototype 2 expert review

Expert review is an interactive multimedia validation validated by three experts or experts. Validity the interactive multimedia developed is assessed by experts or experts based on 3 aspects, namely didactic aspects, construct aspects and technical aspects. The results of the expert review can be seen in the image below.

Table 3. Results of Data Analysis Validation of Three Validators

No	Aspects of assessment	Skore (%)	Criteria
1	Didactic	81,25	Very Valid
2	Construction	85,71	Very Valid
3	Technical	80,95	Very Valid
Rata-rata Nilai Validitas		82,63	Very Valid

Overall interactive multimedia developed has been has very valid criteria, so it can be tested for the next test stage. Data generated from a product that is already valid according to (Arikunto, 2009) it can be said that the product has provided an overview of development goals correctly and in accordance with reality and circumstances actual.

3. Prototype 3 one to one evaluation

Students are asked to give an assessment of the questionnaire provided based on several components, namely in terms of component completeness, presentation, language, and graphics. The accumulated results of the one to one evaluation questionnaire assessment from the three students are 96.2%. The results describe that all components, presentation, and language are already visible in interactive multimedia. the graphic component has several suggestions for revision, namely there are buttons



that do not function properly, and there are images of learning materials that are relatively small so that it is a little difficult for students. So that these suggestions become material for improvement by researchers.

4. *Prototype 4 small group evaluation*

The small group evaluation was carried out by six students. The taking of students is based on the category of students' abilities, which is known from interviews with teachers and students' scores. Students are asked to provide an interactive multimedia practicality assessment used and then fill out a practicality questionnaire. The results of the practicality test by small groups can be seen in the table.

Table 4. Small Group Evaluation Results.

No	Aspects	Skore (%)	Criteria
1	Ease of Use	91	Very Practical
2	Efficiency	83	Very Practical
3	Attractiveness	94	Very Practical
4	Easy to Interpret	85	Very Practical
5	Have Equivalence	85	Very Practical
Average Practicality Score		87.6	Very Practical

These results describe that interactive multimedia material on the respiratory system and excretory system in humans is considered practical and can be used for classroom experiments and further tests. Students are also asked to provide suggestions for the improvement of interactive multimedia developed.

C. Appraisal stage

1. *Field test practical results*

Results of Practicality Assessment by Students and Teachers The results of the practicality of the field test have very practical criteria with a value of 89%. Next, the results of the assessment by the teacher has very practical criteria with a value of 94%. Based on the interactive multimedia analysis that has been developed provide ease of use. Good at presenting material Use easy-to-understand language and clear font sizes. This interactive multimedia is also supported by images and colors. Image that displayed can help students focus on learning material so that it affects the level of understanding and attractiveness of students on learning materials. Learning tools are said to be easy to use when appropriate in the use of language with simple, consistent and easily understood by students (Faisal, 2015). Learning media too have colors, images and icons that match the characteristics of students.

2. *Effectiveness Test*

The results of the effectiveness test obtained in the form of learning outcomes data. The learning outcomes include students' critical and creative thinking skills. Learning outcomes data were obtained through learning outcomes tests conducted at the last meeting. The test is given in the form of essay questions. Data on the assessment of students' critical and creative thinking skills are presented in the table below.

Table 5. T-Test Calculation Results of Critical and Creative Thinking Skills

Thinking Skill	Class	Means	Standard Deviation	Significance	Remarks
Critical	Experiment	73.26	16.586	0.000	Hipotesis Diterima
	Control	52.53	12.792		
Creative	Experiment	74.50	13.731	0.000	Hipotesis Diterima
	Control	57.00	17.021		

Based on the average post test scores obtained by students and based on the results of research using interactive multimedia capable of empowering students' critical and creative thinking skills. This too explained in research that the application of



multimedia interactive ability to improve mastery of integrated chemistry concepts higher order thinking skills such as critical, creative, decision-making and problem-solving skills^[6].

3. Relationship between critical and creative thinking skills

Critical and creative thinking are abilities that must be possessed by someone where this thinking ability is two sides that cannot be released and became the goal of national education. Both said as a necessary skill in life either alone or group. correlation analysis between critical thinking ability and ability creative thinking is 0.816. The value at the significance level is 0.000 which means that there is a relationship between critical and creative thinking of students after using interactive multimedia. Contribution of critical thinking skills on the ability to think creatively by 66.6%. It also means as a large influence of critical thinking skills with thinking skills creative.

CONCLUSION

Based on the development of interactive multimedia for class VIII students of SMPN 2 Pasaman, it was found that interactive multimedia has very valid, very practical and effective criteria, the use of interactive multimedia can empower students' critical and creative thinking skills, and critical thinking skills are related to creative thinking skills after students use interactive multimedia.

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