Development of Interactive Learning Media on Kinetic Gas Theory at SMAN 2 Takalar

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Abstract. Learning media is one of the most factors in supporting successfully in the learning process. The purpose of this interactive media is preparing students to improve skills in laboratory practice without need for assistance and are not bound by time and place. The subject of this study was 30 students grade XI IPA SMAN 2 Takalar. This paper discuss about the development of learning media based in theory of gas kinetic. This media designed to assist students in learning independently. This media made using four software, they are Microsoft word, Snagit Editor, Macromedia Flash Player and Lectora. This media are interactive, dynamic and could support the users desires to learn and understand course of gas theory. The development produce followed the four D models. Consisted of definition phase, design phase, development phase and disseminate phase. The results showed 1) the media were valid and reliable, 2) learning tools as well as hardcopy and softcopy which links to website 3) activity learners above 80% and 4) according to the test results, the concept of comprehension of student was improved than before given interactive media.

1. Introduction
Improvement quality of education is an important thing in this country. Specially for human resources which can affect in this case. In addition, facilities and infrastructure for helping learning and teaching process already developed by government. Which aims to make students easy to understand the explanation of their teacher. There are many way to achieve that goals, they are utilization of technology which existence can’t be denied. In development of technology, there is no doubt that internet has important role to share the information. Technology can have a reciprocal relationship with teaching [3]. So that they can be a good solution in several aspects of life. So the increase Human Resources can be supported by the ability to use technology wisely, especially in education.

Education world always change in create learning innovation. Especially in develop method, teaching material and the media. Therefore as people who play a role in education have to able to utilize technology to develop learning media system that is interactive. Through this media students can do an active learning and increase student’s activity.

Physics is an esoteric knowledge which systematic and unified. Called systematic because one product be related with the other and unified because the product can support each other. Sometimes character of Physics is abstract and concrete. Physics with abstract character is hard to visualized and make student hard in study concept of physics.
This case makes students have assumption that physics is hard and boring. Therefore we need a good approach to solve this problem and good media can help students to develop their ability in physics. Based on previous research, it can be seen that high percentage of students have highly motivated to follow learning process using media because the media help students to understand concept of physics[1]. The Presence of technology is growing on the classroom. The new generations of student come ready to work with these new technology[2].

For make a good utilization of technology, this study will make a interactive media learning that uses by student and teacher. There are 3 variable measured, validity, learning outcomes and student activity in class during the learning process.

2. Experimental Method

2.1 Research Method

This Study includes Research and Development (R&D)[8]. This study has aims to develop an interactive learning media in Kinetic Gas Theory. The development follow the four D style. They are Define, Design, Development and Dissiminate phase. In Define phase, the data is collected from observer the student, school and teacher. Obtained the characteristics from students that they already be able to use computer and internet technology. Internet have the potential to innovate, accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices [6]. Further in design phase, obtained Study plan, students worksheet and draft media. Study plan and worksheet are be planned from define phase. These pictures below shows the Lesson plan and worksheet that has been developed.
One step of the development phase is manufacture digital pocket book as a product of this research. Making an application is adapted to the design plan. Firstly be collecting the material that will be used to fill the content in applications, such as materials, images, animations and simulations. From the define phase, materials prepared by the main material. Then the material is divided into several sub-materials, ie characteristics of the ideal gas law - the law of ideal gas, ideal gas equation and the kinetic energy of an ideal gas. After that, media through the validation phase. At this stage the media validated by two people who are members of the Association of Indonesian Education Evaluation.

2.2 Research Instrument
Instrument is evaluating of Learning Media Sheet. This instruments are used to obtain data on the opinions of experts (validator) on the validity of instructional media that have been arranged as the reference/guidance in revising media. Data validation experts reviewed and analyzed the results of experts to study the media. The results of the study were used as input to revise media enhance learning developed. Second Instrument is validation of learning outcomes test. Learning outcomes test instrument used to measure cognitive abilities of students after being taught by using interactive learning media. These tests were conducted at the end of the learning process. And the last instruments is observation sheet of student activities. This instruments are used to obtain data on the activity of students.

2.3 Analysis Data
Learning outcomes data analysis results done simply by using descriptive analysis. After that Categorize the learning outcomes of students based on the interval of values obtained. Observations of Students activities done by giving a score based on the following conditions:

| Category    | Positive Stat. Score | Negative Statement Score |
|-------------|----------------------|--------------------------|
| Very Agree  | 4                    | 1                        |
| Agree       | 3                    | 2                        |
| Less Agree  | 2                    | 3                        |
| Disagree    | 1                    | 4                        |

3. Result and Discussion

3.1 Digital Pocket Book
Digital pocket book contains several items, such as pictures, animations and interactive simulations that are relevant. Addition of picture and the animation is expected to help students understand the concept of kinetic theory of gases properly. Applications developed starting with the home display and has several items to choose. For examples material, summary evaluation etc. The page is shown in the figure below.
On the menu the material contains a brief description of the material along with equations and graphs. In addition each end submateri equipped with animation and simulation features that facilitate learners to understand the explanation before. The features shown in the picture (b). On summary and a glossary contains a brief description and a list of terms that are used during the learning takes place. The features shown in the picture (d). Menu evaluation is given exercises in the form of multiple choice questions with the number of questions are 10 items. Before learners were asked to do the exercises, there are some guidance in media. So that student could do their task easily.

3.2 Learning Outcomes

Physics learning outcomes of students taught using interactive learning media can be seen in the table and diagram below

| Statistic     | Learning outcomes |
|---------------|-------------------|
| Average       | 10.75             |
| Highest Score | 13                |
| Lowest score  | 5                 |
| Ideal score   | 15                |
| Number of students | 40         |
| Data range   | 8                 |
Based on analysis result performed by students tend to show that learning outcomes are in the good category. The table above shows that the highest scores were achieved is 13, the lowest score is 5 while the average scores is 10.75. The application of educational technology enhances skills and cognitive characteristics [6]. According to the data conducted there are students who have a high score of learning outcomes and accompanied by high percentage of activities. Based on graph below it can be seen regression analysis between learning outcomes and student activities.

**Figure 5. Relationship between Student activities and learning outcomes**

The value of R² is 0.645 it shown that learning outcomes and student activities have relationship. The greater percentage of activities can make greater score in leaning outcomes. The principle, the form of learning activities based on ICT help student in establishing the concepts, procedures, knowledge and express opinion of students in learning. Learning process in oriented by activities as an approach that emphasises the activity of student are optimal to obtain a balanced learning outcomes [7].

### 3.3 Students Activities

Activities of students observed at each meeting consists of several aspects of the observations. Rating activity of students is done by giving a score to each individual who works in each group. The result of analysis is shown in figures below

**Figure 6. Percentage of Students activities at first meeting**

Based on the analysis of the activity of students, found that on any criteria, the majority of learners categorized in very well criteria. All students pay attention to the teacher's explanation at the time of introduction until the end of the lesson. On the visual activities criteria with sub-indicator reading

| Number of interval class | 5   |
|--------------------------|-----|
| Length of class          | 1.6 |
| Standard deviation       | 2.5 |
| Variants                 | 6.24|

| Visual | oral | Listening | Drawing | Mental | Emotional |
|--------|------|-----------|---------|--------|-----------|
| 86     | 86   | 86        | 67      | 97     | 91        |
instructional materials and use media, students were active reading instructional materials. On the oral criteria with sub-indicators answered questions and discussion, students were also seen very active in this criteria. They always work together and sometimes forward ideas. At the listening criteria most learners hear an explanation from the teacher and from friends who are expressing their opinions. Often the teacher gives feedback on this activity by giving a question on the side-lines of learning about what has been described before. So it is apparent that learners really listen to what is described by the teacher.

Drawing activities has a lower percentage than the others. This is due to lack of skills of learners in placing the correct scale to create a graph. The second lowest percentage after drawing a graph is doing the calculations. Most learners perform calculations correctly. Including a pair magnitudes asked by the formula. But in kinetic energy matter learners do not understand of using constants. Because the kinetic energy has two constants used, they are R and K. In addition little things like includes units at each end of the answers are rarely done by students.

Based on the analysis, this is in line with the opinion which says that learning with interactive media is able to change principle of learning from teacher center to the student center dynamically [5]. Learning which use student center principle will make concept assignment be better. This type of learning can make students more autonomous and efficient in time, it means that when they need remedial or enrichment their time no depend to the schedule in school[3]. Although the students were active following study, students still need to be familiarized with the learning patterns using media. The aim is constructing knowledge with minimal teacher assistance [9].

4. Conclusion
Based on the data analysis we can conclude that interactive learning media valid and reliable to use as a learning media. The media can be used well in school due to its portable and can be used anytime and anywhere. When the media applied in school, there are two variable have been measured. First, for learning outcomes conducted average score is 10.75 and it means the score is in high category. Second is activity of students with average percentage is 80%. The high percentage is emotional activity. It means that the students interest with the learning process using interactive media.

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