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Effectiveness of Comic-Based Learning Media on Chemical Bonding Matter

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ABSTRACT

This research is a research and development (Research and Development) that aims to produce a chemistry learning media product through comic visualization on chemical bonding material with a cooperative learning model of the NHT (Number Heads Together) type that is valid and effective. The development of learning media through comic visualization refers to the 4-D development model by Thiagarajan which includes the stages of defining, designing, developing and disseminating. This learning media has gone through a validation stage by validators/experts and has gone through limited trials, and has been revised by the developer to produce learning media that is valid, effective, and practical. The results of this study are: 1) assessment of the feasibility/validity of the media by 3 experts/validators in the very valid category; 2) at the limited trial stage to 21 students obtained an average learning outcome test score of 75 out of an ideal score of 100 with class completion of 81% or 17 people who completed. So the conclusion is that the learning media through comic visualization is valid after going through a feasibility test by the validator and effective after a limited trial was conducted on class X.3 students of SMAN 11 Pinrang.

Keywords: R&D Research, 4-D Development Model, Learning Media, Comics, NHT, Learning Outcome.

INTRODUCTION

One of the most important aspects in supporting the progress of a nation and state in the future is education. This also relates to the teacher's task in helping students understand the concepts of the subject matter. Teachers as educators in achieving learning objectives must use various approaches, strategies, methods and models as well as learning media that are in accordance with what will be taught so that the above tasks can be maximized and implemented effectively and efficiently.

One of the branches of natural sciences included in the secondary education curriculum in Indonesia is the exact subject. Creating various methods, media, and educational support can help students not to feel afraid or feel unable to face exact subjects (Faizi, 2013). Chemistry is one of the branches of science that is important to learn and included in the curriculum in schools. Although chemistry is a very important subject. However, the achievements obtained by students are still in the unsatisfactory category. Students still have difficulties in understanding chemistry lessons.

The results of observations obtained from teachers of SMAN 11 Pinrang through interviews, that the learning outcomes and learning motivation of students in chemistry learning are good although not all students experience this because chemistry lessons are considered difficult and require high understanding. In addition to the characteristics of the material, the learning resources used by students are still limited to the use of varied learning media. One of the learning media often used by teachers is powerpoint presentation media. With a less varied presentation, it can make students bored or less interested in learning chemistry, so their interest in learning chemistry decreases. Researchers also observed students at SMAN 11 Pinrang that

most of the students at the school prefer to read books that contain lots of pictures, and on average often read books that contain cartoon elements. Students at the school also often read comics both in printed form and digitally through an android application called Webtoon.

The results of a survey in the Philippines show that every week children aged over 14 years old around 16% read comics, 17-19 years old around 29.9%, 20-29 years old around 24.9%, 30-44 years old around 24.6%, and 45 years old around 4.6%. When viewed from the level of education, then the comic readers who have elementary school education are around 19.1%, high school around 43.7%, and college level around 37.2% (Asnawir, 2002). And according to McCloud (2001) that when we were children the book we first read were full of pictures and few words that can make it easier for us to understand the contents, along with increasing age we are expected to start reading books that contain more writing and few pictures and finally reach books without any pictures at all which can make it difficult for us to understand them. Based on the survey results above, one of the learning media that contains more images and fewer words is comics which can be used as an alternative learning media that is appropriate and can increase students' interest in chemistry subjects. In general, if a student is asked to read a comic, the student will find it easy to understand the contents of the reading and the student will be more interested in reading if the reading book is illustrated and not only filled with a series of writings. It is different if asked to read a textbook, the student will have difficulty understanding the contents of the reading, especially if what is read is a chemistry textbook (Retno, 2008).

Chemical bonds is one of main materials of chemistry which are materials that serve as guidelines for students in understanding various chemical reactions. Based on the background of the problem that the researcher has described above, the researcher is interested in developing learning media through comic visualization on the main material of chemical bonds with the cooperative learning model of the NHT (Number Heads Togethers) type with the aim of producing learning media products that are valid, effective and practical.

METHODS

This research is a research and development (Research and Development/R&D) which aims to develop learning media through comic visualization. The development of learning media using the 4-D model by Thiagarajan consists of 4 main stages, namely: the definition stage (define), planning (design), development (develop) and dissemination/dissemination (disseminate). The media that is designed and created through manual sketches and media coloring using a computer so as to produce learning media in the form of comics in the form of books that can be used by students through printed results. Learning media through comic visualization is said to be valid if it has been validated by media experts and material experts. The effectiveness of learning media is measured through learning outcome tests.

The limited trial was conducted in the odd semester of the 2016/2017 academic year at SMA Negeri 11Pinrang, and the research subjects were class X.3 students with a total of 21 students.

At the define stage, the steps taken are to determine and limit what is the scope of learning in the development of this learning media. This step is divided into four stages, namely: (a) conducting a front-end analysis as an initial diagnosis to improve the efficiency and effectiveness of learning; (b) analyzing student characteristics; (c) analyzing student tasks (d) analyzing learning materials/concepts; and (e) formulating learning objectives.

The planning stage is to prepare the initial design of the learning media components (prototype). This step is divided into several stages, namely: (a) compiling a benchmark test, (b) compiling media (c) making an initial product design, (d) making an activity plan. The steps taken in making learning media through comic visualization are: 1) determining the story idea, 2) compiling character figures, 3) making a story scenario or story board, 4) making a comic sketch, this sketch is done manually and the image scan stage is carried out for the editing

process using computer software, namely Adobe Photoshop CS 6 and Corel DRAW X7, and 5) printing and binding, printing using a printer and A4 paper.

Development stage, the activities carried out are to produce valid, effective and practical chemical bond comic learning media. This stage includes: (a) validation of learning media by experts (lecturers and teachers) followed by revision, (b) effectiveness of media through actual limited trials on class X.MIA 3 students (quantitative test) to obtain learning outcome data (cognitive). To determine the validity of the media, the validity criteria according to Arikunto in Mayangsari (2014) are used as seen in Table 1. The effectiveness of learning media is obtained from the scores of students' learning outcome tests.

Table 1. Validity Criteria

Average Value	Validity Criteria
3,26 - 4,00	Very Valid
2,51 - 3,25	Valid
1,76 - 2,50	Less valid (revised)
1,00 – 1,75	Not valid (total revision)

RESULTS AND DISCUSSION

1. Phase 1: Define

Activities at this stage are carried out to establish and define development requirements. Things to do at this stage:

Front-end analysis includes curriculum analysis. SMAN 11 Pinrang has implemented the Independent Curriculum. The Independent Curriculum expects students to have a greater role in achieving educational goals. Teachers must be more creative and innovative in creating and managing the learning process in the classroom, including in selecting the right learning media for students. Based on the results of interviews regarding the use of learning media in schools and curriculum analysis, it was decided to develop learning media through comic visualization.

The researcher found that the cognitive level of class X.3 students is still categorized as low, because in receiving the material most of them have difficulty understanding the chemical bond material if only given an explanation verbally without any picture of it. Therefore, the researcher designed a learning media in the form of a comic that contains chemical bond material with language that is easy for students to understand. Task analysis based on the main material of chemical bonds is obtained based on students' ability to answer the tasks in the chemical bond comic. The assignment activities for these students are adjusted to the material in the comic that has been designed previously.

2. Phase 2: Design

The second stage is designing comic-based learning media. Based on the definition stage, the product design (Learning Media through Comic Visualization) was obtained in the form of a book with three main parts, namely introduction, content, and conclusion.

After making a product design, then a Learning Media is made through Comic Visualization with the process of making: Story Idea and Making a Scenario Script. The idea of this comic story is about two students, Mia and Randi who have a greater curiosity about chemistry subjects, especially the material of Chemical Bonds and a Chemistry teacher named Mr. Hamka who has a robot named Ohu. After making a scenario script, the next step is making images by drawing manually then scanning them, then coloring and filling in text using the Adobe Photoshop CS6 and Adobe Photoshop CC Professional applications. The last step in designing a Learning Media product through Comic Visualization is to compile the introduction, contents and closing. After the compilation is done, the next finishing draft of the

Learning Media through Comic Visualization is printed in color using A4 Art Paper (21 cm x 29.7 cm).

Design stage, the researcher designed the physical form, introduction, content and closing of the Learning Media through Comic Visualization. In making Learning Media through Comic Visualization, the researcher was assisted by an illustrator to draw manually, then Scanned to carry out the coloring and text filling process digitally through the Adobe Photoshop CS6 and Adobe Photoshop CC Professional applications. Learning Media through Comic Visualization was printed in color with A4 Art Paper (21 cm x 29.7 cm). The development stage was carried out to determine the feasibility of the media or the validity of the media by assessing the Learning Media through Comic Visualization by Media Experts and Material Experts. There were 3 Experts, namely 1 Media Expert from the Lecturer of the Fine Arts Education Study Program, Fine Arts Department, FSD UNM and 2 Material Experts from the Lecturer of the Chemistry Department, FMIPA UNM, providing assessments and suggestions for improving the media. The researcher revised the parts of the media that were considered inappropriate so that they produced Learning Media through Comic Visualization that were suitable for use in limited trials in small groups, namely Class X.3 SMAN 11 Pinrang.

The learning media that has been declared suitable for use is implemented in Class X.3 students of SMAN 11 Pinrang. This trial aims to determine the effectiveness of the media developed. At this stage, students seemed very interested in learning Chemistry and were enthusiastic during the learning process. This can be seen from the very good response of students when learning using Learning Media through Comic Visualization.

3. Phase 3: Develop

In the context of developing learning media that is tailored to the needs of researchers, the following steps are taken:

The data collected in this case are quantitative data as primary data and qualitative data as suggestions and input from the Experts. The assessment of the feasibility of Learning Media through Comic Visualization was carried out by 1 Media Expert and 2 Material Experts who aimed to determine the feasibility or validity. Based on the results of the Experts' assessment of Learning Media through Comic Visualization, an overall assessment of the media was obtained in Table 2.

Table 2. Recapitulation of Learning Media Assessment Results through Overall Expert Comic Visualization

Aspects	Validator		Average	Category
	Media Expert	Material Expert		
Content	-	3,62	3,62	Very Valid
Language/Communication	4,00	3,59	3,80	Very Valid
Presentation	4,00	3,70	3,85	Very Valid
Media Effects on Learning Models	4,00	3,50	3,75	Very Valid
Overall View	3,77	3,71	3,74	Very Valid
Overall Score Average			**3,75**	**Very Valid**

Source: Processed Development Research Data

The feasibility of Learning Media through Comic Visualization is known through the assessment stage by the Experts. The Validators/Experts selected by the researcher consist of 1 Media Expert and 2 Material Experts. The results of the assessment of Learning Media through Comic Visualization as a whole which have been assessed by the Experts obtained an average of 3.75 with the Very Valid category. Thus, Learning Media through Comic Visualization on chemical bonding material is feasible to be used as a learning media for Class X.3 students of SMAN 11 Pinrang.

Limited trial (small group) on students of class X.3 SMAN 11 Pinrang. The learning outcome test data (cognitive aspect) obtained by students is quite good with the percentage of

class completion reaching 81% which means it has passed the class completion percentage. The overall data from the student motivation questionnaire, the percentage of learning motivation of class X MIA 3 students of SMAN 11 Pinrang is included in the Very High category, namely 83.14%. Based on these results, it shows that the media developed meets the criteria for effective learning.

This limited trial is to determine the effectiveness and practicality of Learning Media through Comic Visualization. To see the effectiveness of the media developed, data is needed from learning outcomes. The results of the analysis of student learning outcome tests obtained an average score of 75 from an ideal score of 100 with a class completion percentage of 81% meaning that there are 17 students who have completed.

The results of this development research are in accordance with the theory explained by Arsyad (2011) that learning media can increase and direct children's attention so that it can create learning motivation, student interaction, and student learning independence. This is proven to be a valid media, and after the trial it was declared effective.

The limitations of Learning Media through Comic Visualization based on the development research conducted are: the resulting Learning Media product through Comic Visualization only conveys one basic competency of the core competency of chemistry subjects, namely on chemical bonding material, the research subjects are only students of class X.3 SMAN 11 Pinrang, the distribution of Learning Media through Comic Visualization was not carried out due to the limitations of the researcher.

CONCLUSION

The media developed using the 4D development model by Thiagarajan which consists of 4 stages, namely defining (Define), designing (Design), developing (Development), and disseminating (Disseminate) using valid, effective, and practical criteria for assessing the feasibility of the media used. The Development of Learning Media through Comic Visualization was developed to be valid through the feasibility test stage through expert validators to test the validity of the media before being tested, and was effective after being tested limited to Class X MIA 3 SMAN 11 Pinrang students and teacher responses to the developed learning media. Based on the development research as explained, using Learning Media through Comic Visualization still has many weaknesses. Therefore, some suggestions for further utilization and product development are needed, namely the development of Learning Media through Comic Visualization can be done for other main materials and for further researchers, further research needs to be conducted to obtain more data, input and suggestions in order to use Learning Media through Comic Visualization that is developed more optimally.

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