Integrated Science Learning Development of Model Inquiry Training Based on Comics

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Abstract. This research aims to get the product of the learning device of science. The research method is research and development (R & D) research with the model of Gall, and Borg. This study finds an integrated Science learning model of comic-based student books. This product has been validated by a team of experts stating that the ingredients have been performed by appropriate methods and procedures for needs analysis, planning, evaluation and stages for using the materials for the study. The results of trials on the use of product results that have a real impact on student learning outcomes. The implications of the findings of this study provide inspiration and role models for other teachers in designing their learning materials.

Keywords: Integrated Learning, Inquiry Training, Comics

1. Introduction

Integrated Sciences is an effort to integrate knowledge comprehensively and integrated. Integrated learning in elementary schools helps develop students' understanding which results in students becoming more involved in learning (Slekar, et. Al, 2003). This learning is right with the characteristics of elementary school students who are still in the concrete operational stage. In the learning process students are directed to be directly involved with the environment around them, by seeing, feeling, feeling, smelling, and listening or learning that involves all five senses of students, so that learning is more meaningful.

Integrated learning as an approach to integration naturally connects facts and ideas to understand the world. Through a theme network, students can connect ideas with experience and the environment where students live. Recognizing the importance of being integrated into welcoming the learning needs of young adolescents in the 21st century and preparing them to develop the high-level thinking skills needed in an increasingly global era (Davies, et.al, 2011).

The 2013 curriculum for elementary schools was designed using integrated thematic learning which was implemented starting from class I to grade VI elementary school. Psychological views that underlie integrated learning, namely students see themselves and their surroundings as a whole (holistic). In this case, the students construct their knowledge and build their reality. One effort to enable students to build their reality can be applied to the inquiry learning training model.

Lawson (2010: 111) asserts that the inquiry training learning model allows students to examine previous concepts and to debate and test these concepts. This, in turn, triggers disequilibrium and provides an opportunity to build new concepts and become more expert in using reasoning patterns used in constructing concepts. Through inquiry learning training models, the ability to ask questions and find answers to learners' curiosity can be increased through activities training carried out in learning that applies the inquiry training model which in turn is expected to improve the achievement of learning the success of students.
Some of the results of research on inquiry include: (1) Ergul et al. (2011) researching inquiry-based learning significantly enhancing students' science process skills, (2) research on Waruwu and Motlan (2014) found the use of training inquiry learning models better than the use of conventional models to improve learning outcomes, and (3) the Harahap and Sinuraya (2013) research shows that the application of the inquiry training learning model has a significant effect on student learning outcomes.

Comics are media that have a simple, clear, and easy to understand nature, therefore comics can be informative and educative media, (Waluyanto, 2005). The existence of comics as part of the world of art which is the result of human creativity and intention that departs from the combination of stories and images, so that it can be used as a learning media. Besides, comics also have an extraordinary appeal so that the messages conveyed are easily digested and understood, and also do not seem to be patronizing.

Media comics is an alternative form of learning media. The technique of using comic media is based on an approach that prioritizes communication and reading activities by paying attention to pictorial stories while practicing conversations that are already available so that directly or indirectly, students will emerge their own potential. An analysis of comic language by Thorndike shows that children's interest in reading comics is almost twice the number of words that can be read in reading books. A good comic is a comic that matches the learning objectives.

Some of the results of research on comics as a medium that can improve processes and learning outcomes include: (1) Weber et al. (2013) found the use of comics as an alternative that can be used in improving Chemistry learning outcomes, (2) Jee and Anggoro (2012) research showing the use of comics in learning has an impact on improving students' cognitive abilities, and (3) Yulianti's research, Khanafiyah and Sulistyoriini (2016) find the use of comics in inquiry-based Physics learning can improve learning outcomes.

The inquiry training learning model was developed by Suchman, who focused on learning on the activities of students conducting investigations and explaining unusual phenomena (Joyce and Weil, 2003). Schuman developed an inquiry training learning model by analyzing the methods used by creative research personnel.

The purpose of the inquiry training model according to Joyce and Weil (2003) is to help students develop skills in asking questions and exploring hidden things in a phenomenon in learning. Through the application of inquiry training learning, it can arouse students' curiosity about an interesting matter.

Joyce and Weil (2003) propose the syntax of the inquiry training model, namely: (1) confronting students with a problem, (2) collecting data verification, (3) collecting experimental data, (4) processing, formulating an explanation, (5) analyze the research process.

Following the stages of child development, the characteristics of the way children learn, the concepts of learning and learning are meaningful, then learning activities for early elementary school students should be done with thematic or integrated learning. The theme is the main idea or idea that is the subject of discussion. According to Fogarty (1991), a thematic learning model called the webbed model is the most popular model in integrated learning.

According to Hernawan (2014), the notion of thematic learning can be seen as: (1) learning that departs from a particular theme as a center of interest that is used to understand the symptoms and other concepts, both from the subject in question as well as from other subjects; (2) a learning approach that connects various subjects that reflect the real world around and within the range of abilities and development of children; (3) a way to develop children's knowledge and skills simultaneously (simultaneous); (4) assemble and combine a number of concepts in several different subjects, with the hope that students will learn better and meaningfully.
Thematic learning emphasizes the concept of learning while doing something (learning by doing). Therefore, teacher skills are needed to package or design learning so that students gain meaningful learning experiences, learning experiences that show a link between conceptual elements as well as between subjects. Linkages of the conceptual elements will form a scheme so that students gain wholeness and roundness of knowledge.

Comics are images that are lined up in a deliberate sequence intended to convey information or produce an aesthetic response from the reader (Cloud S., 2001). Comics in the Indonesian etymology comes from the word "comic" which is more or less semantically meaning funny, a joke. With this understanding, it is appropriate if many people have a perception that comics are identical to something funny. Funny in this case includes the aspect of the figure displayed and also the content that is in the comic.

Comics are a form of a cartoon that expresses characters and plays a story in a sequence that is closely linked to images to provide entertainment to its readers (Sudjana and Rivai, 2006). With various definitions originating from these figures, it is not surprising that the title of comfort and fun has been attached to comics since its inception in the 1980s.

Comics as a form of a cartoon that expresses the character and apply a story in a sequence that is closely related to images and designed to provide entertainment to readers (Daryanto, 2010). Equipped with speak balloons, there are times when there is still narration as an explanation. The greeting balloon and the image expression from the comic are the communication media of the reader with the comic.

Fun learning will make the brain of the learners in a relaxed state so that the lessons delivered will be better absorbed. Material that is considered complicated will be able to be deciphered. The advantages of comics as learning media are: (1) the main role of comic books in instructional is their ability to create interest in students; (2) guiding interesting reading interest in students; (3) through guidance from the teacher, comics can function as a bridge to foster interest in reading; (4) comics add to the vocabulary of the reader's words; (5) making it easier for students to catch abstract things or formulas; (6) can develop children's reading interest and one of the other fields of study; and (7) the entire comic storyline goes to one thing, namely goodness or another study.

2. Research Method
This research is Research & Development (R & D) research. The development research model referred to was Gall, and Borg (2007) who adopted the models Dick, and Carey. The study population was all private elementary schools in the city of Medan. The research sample was 2 schools. The second determination as a sample of the study was carried out based on purposive sampling meaning that both schools had implemented integrated science learning.

3. Result and Discussion
Development of integrated science learning in inquiry-based models of comic-based training is a learning model that is specifically used in integrated science learning by utilizing comics as media used to facilitate students to learn. The aim of developing learning is to provide guidance for teachers and students in planning, managing, developing and evaluating learning activities.

For this reason, the development of integrated science learning in an inquiry-based model of comic training is complemented by learning implementation plans, teacher books and student books as a whole in the series used in learning. The availability of learning tools can facilitate teachers and students to achieve competencies it is expected that the creation of a quality learning process, student participation in learning and achievement of competencies and learning outcomes are achieved.
The feasibility of the product of integrated science learning development is done by asking the opinion of experts, namely material experts, media experts and languages in a row can be seen in the following Table 1-4.

**Table 1. Recapitulation of the Expert Feasibility Test Results of Lesson Plan**

| No | Expert   | Average Score | Category               |
|----|----------|---------------|------------------------|
| 1  | Mastery  | 3.91          | Very Worthy            |
| 2  | Media    | 3.69          | Very Worthy            |
| 3  | R&D      | 3.13          | Worth without revision |
| 4  | Language | 3.78          | Very Worthy            |
|    | Cumulative Average Score | 3.62          | Very Worthy            |

Based on the table 1, it can be seen the cumulative average score of expert assessment of the planned implementation of integrated science learning comic inquiry-based training model which is 3.62 and this figure is in the feasibility category which is very feasible. Even though it is in a very decent category, the researcher revised in accordance with the suggestions submitted by the expert.

**Tabel 2. Recapitulation of Results of Expert Feasibility on Teacher's Book**

| No | Skill   | Average Score | Category               |
|----|---------|---------------|------------------------|
| 1  | Mastery | 3.88          | Very Worthy            |
| 2  | Media   | 3.60          | Very Worthy            |
| 3  | R&D     | 3.15          | Worth without revision |
| 4  | Language| 3.65          | Very Worthy            |
|    | Cumulative Average Score | 3.57          | Very Worthy            |

Based on table 2, it can be seen the cumulative average score of expert assessment on integrated science learning teacher books, comic-based inquiry training model, which is 3.57 and this figure is in the feasibility category which is very feasible. Even though it is in a very decent category, the researcher revised according to the suggestions submitted by the expert.

**Table 3. Recapitulation of Results of Expert Feasibility on Student Books**

| No | Skill   | Average Score | Category               |
|----|---------|---------------|------------------------|
| 1  | Mastery | 3.95          | Very Worthy            |
| 2  | Media   | 3.80          | Very Worthy            |
| 3  | R&D     | 3.00          | Worth without revision |
| 4  | Language| 3.90          | Very Worthy            |
|    | Cumulative Average Score | 3.66          | Very Worthy            |

Based on the table3, it can be seen the cumulative average score of expert assessment of integrated science learning student books in comic-based inquiry training model which is 3.66 and this figure is in the feasibility category which is very feasible. Even though it is in a very decent category, the researcher revised according to the suggestions submitted by the expert.
Table 4. Recapitulation of Results of Expert Feasibility on Model Books

| No | Skill  | Average Score | Category          |
|----|--------|---------------|-------------------|
| 1  | Mastery| 3.67          | Very Worthy       |
| 2  | Media  | 3.87          | Very Worthy       |
| 3  | R&D    | 3.26          | Worth without revision |
| 4  | Language| 3.73         | Very Worthy       |
|    | Cumulative Average Score | 3.63 | Very Worthy       |

Based on table 4, it can be seen the cumulative average score of expert assessment of the integrated science learning model book comic-based inquiry training model which is 3.63 and this figure is in the feasibility category which is very feasible. Even though it is in a very decent category, the researcher revised according to the suggestions submitted by the expert.

Furthermore, individual trials were conducted, small group trials and field group trials. The following are the test results:

Table 5. Recapitulation of Student Book Trial Results

| No | Test group | Average Score | Category          |
|----|------------|---------------|-------------------|
| 1  | Individual | 0.76          | Very Worthy       |
| 2  | Small Group| 0.87          | Very Worthy       |
| 3  | Field Group| 0.93          | Very Worthy       |
|    | Cumulative Average Score | 0.85 | Very Worthy       |

Based on the table above it is known: (1) the results of individual trials on integrated book science students’ product products in comic-based inquiry training models obtained an average score of 0.76 with a very feasible category, (2) small group test results on learning student book products Integrated science-based comic inquiry training model obtained an average score of 0.87 with a very feasible category, and (3) the results of field trials on integrated textbook learning products in comic-based inquiry training models obtained an average score of 0.93 with a very decent category. Furthermore, if viewed cumulatively the average score of the test results on integrated science learning student book comic-based inquiry training model is 0.85 and this figure is in the feasibility category which is very feasible.

The average student learning outcomes in the integrated science study field before and after the use of integrated science learning development products in the comic-based inquiry training model can be seen in Figure 1.
Figure 1. Learning Outcomes Before and After the Application of Integrated Science-Based Learning Development Products Inquiry Training Model-Based on comics

Based on Picture 1 above, it can be seen that the average student learning outcomes before the use of the integrated science learning development products inquiry model of comic-based training is 40.21 and has increased after being applied with an average of 71.05. This proves that the use of learning development products can improve student learning outcomes.

The effectiveness of testing through statistical tests obtained the price of count 25.91 and the price of the t table with N - 1 = 57 - 1 = 56 at α = 0.05, which is 2.660. Because the price of t count > t table price then Ho is rejected, it can be concluded that the integrated science learning product comic-based inquiry training model has a real effect on student learning outcomes.

The findings of the research above illustrate that the learning applied in the classroom will be able to run effectively, efficiently and attractively and must be initiated through a systematic and systemic process of learning design. For this reason, we need a quality development learning design that can be guided by teachers and students in carrying out learning.

Meanwhile, the quality and success of learning in principle depend on the quality of the learning design itself. Therefore, it is truly naive if learning is done without a clear or even irony design if learning is done without any design at all or flows just as it is.

The role of the teacher becomes urgent in designing learning, in this case, the teacher must have a clear vision and sharp analysis of the design of the learning plan so that students can facilitate learning. In other words, the main objective of learning design is to make learning more efficient, effective and in its implementation to avoid student learning difficulties. In other words, the quality and success of learning in principle depend on the quality of the learning design prepared by the teacher.

Efforts to improve the quality and success of learning, teachers are expected to have the ability to make changes in learning towards higher quality. In this case, the true learning must be able to make students able to construct or build their knowledge not only to obtain knowledge transfer from the teacher alone. To achieve this, the learning carried out in the classroom is an intentional activity or designed by the teacher to students to achieve certain goals in the form of expected competencies after following the learning. In this regard, De Guess as quoted by Fullan (1993: 43) explains that each individual/unit must develop the ability to move and make changes, develop new skills and attitudes and each individual/unit
must develop learning abilities. The explanation presented by De Guess emphasizes that teachers as individuals are required to have personal abilities in designing learning. Because this integrated science learning product inquiry-based model of comic training is intended for face-to-face learning activities, in this case, it is necessary to examine Superman's explanation (2012: 287) as follows: (1) compilation of learning resources available and relevant to the strategy compiled learning; (2) learning outcomes assessment materials that are suitable with the learning objectives; (3) teaching guidelines on how to use compilation materials; and (4) students' guidance on how to learn and participate in learning activities under the leadership of the teacher.

Based on Superman's explanation above, the product of integrated science learning development in the comic-based inquiry training model developed is expected to be a guide and reference that can be used by teachers in teaching and students who take part in learning. The tools contained in integrated science learning development products in inquiry-based learning models are (1) learning implementation plans; (2) teacher books; and (3) student books.

The existence of integrated science learning development products in the comic-based inquiry training model designed in the form of learning implementation plans, teacher books and student books in line with the explanation of Dick, Carey and Carey (2009: 230) that the development of learning contains material, content or well-written content, mediated, or facilitated by the instructor, through which students will use it to achieve learning goals, including materials for general purpose and special purposes and materials to improve students' memory.

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4. Conclusions

This research has reached its goal of finding the development of integrated science learning in an inquiry-based comic training model developed for learning in elementary schools. Learning development is developed from the study of learning needs analysis needed in the implementation of learning in elementary schools. Learning development products are equipped with learning implementation plans, teacher books, and student books.

The results of the feasibility of product development learning have been carried out by the right methods and procedures so that it is feasible to use. Then proceed with individual tests, small group tests,
and field group tests. Furthermore, learning development products are carried out effectiveness tests which show the results have a real effect on student learning outcomes.

The process and dynamics in designing products for integrated science learning development in an inquiry-based comic training model is inseparable from the scientific approach that is limited to the scientific development of learning but has links with other scientific fields including learning design science, research methodology, and communication science.

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