



The Use of Kuark Science Comics in Science Learning in Elementary Schools

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Abstract. This study aimed to determine how teachers use the science comic “Kuark” in science subjects at SDIT As-Salamah Baturetno. The method used in this study was qualitative used three data collection techniques in the form of interviews, observation, and documentation. Test the validity of the data in this study used the triangulation of sources and methods. Data analysis in this study were data collection, data reduction, data presentation, and conclusion. The results of this study indicated that teachers used the science comic “Kuark” in private hours with lecture and experimental method in distributing science material in comic to students. The implications of this study were: First, the science comic “Kuark” can be used as a choice for teachers as a medium for science learning to students other than conventional books. Second, teachers can use it as a learning resource to understand science material to avoid misconceptions when delivering material. Third, the media fosters a love of science material in students.

Keywords: Utilization · Learning media · Science comic · Kuark

1 Introduction

In life, humans cannot be separated from learning activities. Learning is an activity carried out by individuals to increase knowledge, skills, and attitudes with changes in behavior [1]. In modern times, learning has become necessary to catch up or equalize in line with the development of increasingly massive science and technology. Schools are places for humans to carry out learning activities to gain knowledge in which there is a learning process.

Learning is the interaction of educators in transferring knowledge, forming attitudes, and helping students to learn well [2]. The quality of learning starts from the success of educators in innovating and creating a pleasant learning atmosphere and can increase motivation, interest, and learning outcomes to develop effective learning [3]. In developing academically, the correct method must be applied by the teacher so that the level of student talent develops to its actual status [4].

Science is a scientific field that studies nature systematically so it involves the process of scientific discovery, and mastery of facts, concepts, and principles so that a need for scientific literacy skills in learning [5]. Science literacy is the ability to identify, explain

and solve issues in science by connecting evidence and existing events. Science literacy needs to be mastered by students as a provision in facing the challenges of the times by using scientific knowledge to identify things, explain events scientifically, and draw conclusions based on existing facts.

Science learning carried out by teachers who only rely on textbooks as learning media can make elementary students feel bored and their learning motivation decreases because the readings presented are less exciting and only listen to the teacher's explanations in learning. In addition, students do not develop their creative thinking and the perception arises that learning science is complex. Natural Science Subjects (IPA) are considered complex subjects for elementary students from the teacher's teaching method or from students who have not understood the concepts of science material.

Students' difficulties in learning science have 2 factors: interest, self-confidence, motivation, goals, and study habits, while external factors include the role of teachers, availability of infrastructure, assessment policies, curriculum, and social environment at home and school [6]. The curriculum consists of science because it contains the prior knowledge students need as a provision to master technology [7].

Based on the explanation, science subjects are basic knowledge in dealing with the times through scientific attitudes that are formed in students, requiring teachers to be innovative in teaching science in schools. However, some teachers still choose to train with conventional books and do not use learning media. In line with the results that the difficulty of learning science at the elementary school level in terms of internal factors can be caused by variations of teachers in teaching, infrastructure, and learning environment [8]. Teachers need to use learning support media and use them well so that science learning objectives can be achieved optimally.

Learning media is a tool to support the effectiveness of learning to achieve the desired goals [9]. Learning media is a physical means in the form of books, videos, films, and so on to convey content or learning materials [10]. In the selection, teachers need to adjust the abilities and characteristics of their students. Comic media can be used as a suitable means to support the inculcation of science concepts in students. Comics are media that contain cartoon images that act as actors who have characters and are presented coherently to form a story [11].

The science comic "Kuark" can be used as a learning medium by the teacher in which there are pictures accompanied by color with an adventure-themed storyline that packs science material and is presented simply so that it can stimulate interest in learning and facilitate the delivery of information so that the quality of learning increases [12].

The science comic "Kuark" presents science material with exciting visualizations and a storyline played by characters with different characters. The characters are depicted in colored cartoons and several images related to the material are visualized using original photos. This exciting and colorful material is other from the packaging of material in conventional books so it is not dull to read. This is in line with study from Andriyani & Kusmariyati, (2019) that in learning, comics media can add to the attractiveness of students because of variations in images and coloring [3]. Reading material in the form of colorful pictures is preferred by elementary school students to reading an extended text [9]. In addition, there are fun science experiments to hone children's critical thinking through observation, experimentation, and analysis.

Studies related to comics media as learning media have been carried out by previous authors, associated with the effect of using wits media in straightening the stigma about epilepsy at the secondary school level, it was concluded that the use of comics could increase knowledge, attitudes and justifications for wrong perceptions about epilepsy [13]. Similar study was also conducted developing educational cartoons with the theme of clean and healthy living for elementary school students so that students' understanding is better and more meaningful [14]. Related the effect of comics on students' independence in learning mathematics [15]. Associated the influence of the educational comic book "Ao Tsara" with raising awareness about epilepsy in Madagascar [16].

Related the use of comics as a medium for learning history in improving student learning outcomes and motivation with the literature study method which shows that comics can motivate students to study historical material so that learning outcomes increase [17]. Develop learning media in the form of comics for social studies subjects with the result that the media is effectively used in the learning process [18]. Examines the use of comic strips as a learning medium for economics students, which is proven to affect learning outcomes [19].

Related to the application of digital comics at the junior high school level, proving that there is an increase in learning outcomes after applying digital comics as learning media [20]. Related the use of the experience-sharing model on science learning outcomes through the use of comic media, which shows that the use of the model and the use of amusing media by authors is more effective than conventional learning models [21]. Conducted an experiment using comics media in two elementary schools and divided them into experimental and control classes; the experiment's results proved that comics media increased students' motivation and learning outcomes in mathematics [22].

Based on the description of the previous study, this study has differences. The difference in this study lies in the object, purpose, and technique used. In this study, authors describe teachers' use of the science comic "Kuark" as a medium of learning in science subjects at the elementary school level through interview techniques. This study aims to determine how teachers use the science comic "Kuark" in science subjects at SDIT As-Salamah Baturetno.

2 Method

Type and Design

The type of study used was qualitative. Qualitative is a scientific approach that examines problems involving individuals, phenomena, and social phenomena [23]. This study was conducted at SDIT As-Salamah Baturetno, Wonogiri Regency, Central Java, Indonesia. Based on a preliminary survey conducted by the authors, the science teacher at the school used the comic "Kuark" media, which had been widely circulated as teaching material for teachers and students to emphasize science material outside and during learning.

Data and Data Sources

Sources of data for this study included primary and secondary data. Primary data was from interviews, observations, and documentation, while secondary information was by

reviewing data through articles, books, and the internet and then linking the findings to the results of interviews. The interviewees were a science teacher and a 6th grader who was also a finalist in the OSK (Kuark Science Olympiad) and OSN (National Science Olympiad) competitions and made it to the provincial level. Interview and observation techniques were carried out by going directly to schools to determine the use of comics by teachers and students' perceptions in understanding science material through the Science Kuark comic book.

Data Collection Technique

Data collection techniques carried out by the authors were through interviews, observation, and documentation. Statements were made by going directly to the school and observing student activities in the library. The authors conducted interviews with science teachers as informants, a grade 6 student who subscribed to the science comic book "Kuark", and OSK or OSN participants as supporting informants.

Documentation was done on the science comic "Kuark" page, which contains science material. The questions asked were about the teacher's use of the science comic "Kuark" and the student's perception of using the comic book as a learning support. The interview questions asked were as follows (Table 1).

Data Validation

The authors used triangulation of sources and methods to test the validity of the information. Source triangulation is triangulation to compare the data obtained by authors with other sources to explore the truth of the information obtained [24]. Meanwhile, the triangulation method did by comparing information or data in different ways.

Data Analysis

In this study, a qualitative data analysis process was used. The steps of data analysis in this study were data collection, data reduction, data presentation, and conclusion.

Table 1. Question asked

For Teacher	For Student
When did the teacher use the science comic "Kuark" with the students?	How does the teacher explain the material during private hours?
How to use the science comic "Kuark" in science lessons?	When reading the science comic "Kuark", did you have any difficulties discussing it?
What are the teacher's steps during private hours?	Can the science comic "Kuark" make it easier for you to understand science material?
In your opinion, is the science comic "Kuark" enough to instill science concepts?	

3 Result and Discussion

Based on studies that have been conducted through interviews conducted by authors with science teachers at SDIT As-Salamah Baturetno, it was explained that at first the teacher used the science comic "Kuark" as a teacher learning resource in studying science material which would later be delivered to students during learning with language that students easily understand. The teacher uses the science comic media "Kuark" during private hours, which is held once a week within one hour lesson and is valid for grade 1 to 6 students.. In this hours, Teachers carry out coaching and mentoring, especially in capturing students who have the potential to follow National Science Olympiad and Kuark Science Olympiad. Aspects saw by the teacher in capturing students through logical thinking skills, activeness, and academic ability (Fig. 1).

"I used the comic as a tool for me as a science teacher in learning and then explained the science material in an easy-to-understand language."

"There is time in your private hours, ma'am, once a week for each class level."

"Well, that's where the ustazah used the time for his main coaching from the science comic "Kuark" to attract potential children in OSN".

"So children come during private hours according to class groups in the library to be mentored."

"Aspects that are seen are the ability to think logically, absorb what is conveyed, enthusiastic when explained, lastly academic ability."

The material taught by the teacher every week follows the rubric contained in the science comic "Kuark".The headings in the science comic "Kuark" include botany, zoology, physics, astronomy, the human body, and others (Figs. 2 and 3).

"There are no technical steps, Ms. So the weekly material adjusts the rubric in the science comic "Kuark".

The science comic "Kuark" level I Edition 11 (Fig. 4) has a zoology rubric. The rubric discusses the scope of animals. This page contains science material for grade 1 KD 3.4. He was observing the vocabulary in the text about the concepts of characteristics, needs (food and a place to live), growth and development of living things. The scene in the comic tells about the changes experienced by animals from childhood to adulthood. The little lion character Lio in the comic is said to be experiencing confusion because his body and voice are different from the lion's father. Then a Kuark character, depicted as a bee, comes to calm Lio's personality by explaining why the sound and appearance of a lion's cub are different from that of an adult lion.

In the scene, the teacher re-explains to the students that living things go through a period of growth and development. Then the teacher gives another example of living things that undergo a period of growth that students encounter in everyday life. The teacher asks students about pets and gives apperceptions to students, such as "What changes have happened to the animals you keep, mother?". From this apperception, various answers from students emerged. Then the teacher and students conclude together.

"Of course not... even though students have read comic books, although the presentation of the material is easy to understand, reading comics alone is not enough to instill concepts in students. For example, "clumping" needs explanation and examples in everyday life. So later when I'm studying, I'll explain it like this, man, have you ever

Fig. 1. Lesson timetable



Fig. 2. Cover of comic science Kuark

seen stale milk? There's white on the top of the water, called clumping or the process of clumping milk like that



Fig. 3. Rubric of komik science Kuark



Fig. 4. Scenes of animal growth and development material story

Level II Edition 11 on page 5 (Fig. 5) contains material about the metamorphosis of living things. The material is included in the content of the 4th-grade science lesson KD 3.2 Comparing the life cycles of several living things and comparing the life cycles of various living things and linking them to conservation efforts. Metamorphosis material is packed with scenes played by Borat and Grumel who find a caterpillar named Keket. However, a few days later Borat looked worried because he found a keket that turned into a cocoon until it finally became a butterfly. Then came Grumel who explained the life cycle

experienced by the keket. In this case, Grummel describes complete metamorphosis. Then, another character came carrying a grasshopper. Just like in the previous scene, Grummel also explained the life cycle of grasshoppers. In this case, Grummel describes incomplete metamorphosis.

On the last page of the rubric are simple practice questions that students can answer (Fig. 6).

On page 5 (Fig. 7) there is a rubric of the human body. The header tells about things related to the human body. The heading in the comic contains material about passive and active locomotion tools included in the 5th-grade science material KD 3.1 Explaining the locomotor organs and their functions in animals and humans as well as how to maintain

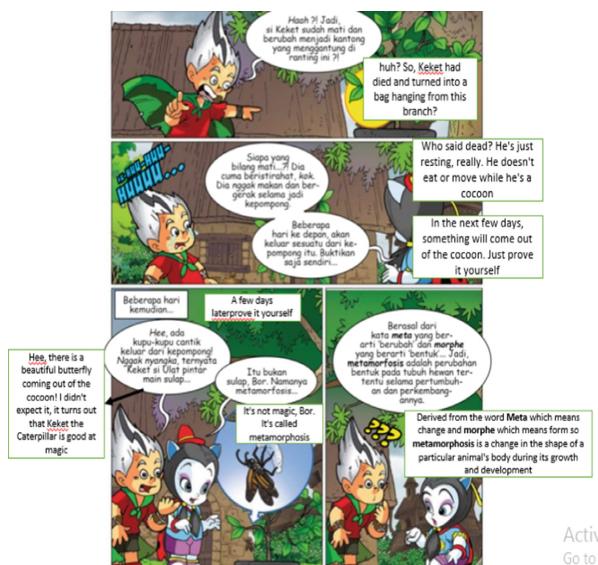


Fig. 5. The story scene “Where did Si Keket go?”



Fig. 6. Simple practice question

the health of human locomotion. In the story's scene, the Kuark character explains how the body can move caused by bones as an active means of travel and muscles as a passive means of locomotion. It presents a picture of the skeleton of the body's bones and illustrates muscle movement.

In addition to the lecture method, the teacher also invites students to conduct experiments. Usually, the teacher places the investigation in the 4th week. Before the meeting, the teacher informs the students about the tools and materials to be brought and the division of groups through the class group WhatsApp. The sources used by the teacher in conducting experiments came from the science comic "Kuark" (Fig. 8) or other sources adapted to the material. The teacher accompanies students when conducting investigations and provides worksheets to write down the results of the experiments that have been carried out.

"Yes, lecture method 3 times...experiment 1 time."

"Tools and materials for children to bring, announcements from the WhatsApp group the day before practice."

"Some use worksheets (to fill in the experimental results) depending on the material."

"Some are from comic books, and some are not."

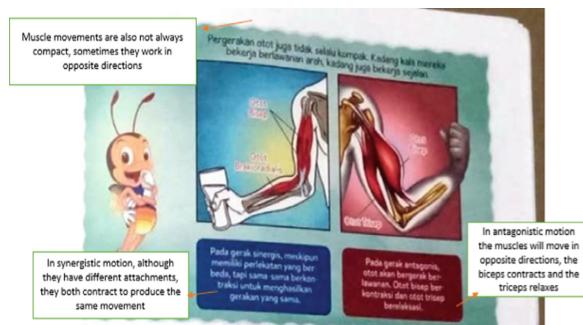


Fig. 7. Display of the rubric of the human body



Fig. 8. Experimental rubric

In addition to explaining the material, the teacher also provides a summary (Fig. 9) to make it easier for students to recall and explore the material studied, especially for students who will participate in the Science Olympiad.

"Besides, I made a summary for the children that contained the main points."

"So the children gather according to class groups; after that the summary of the material is distributed."

"All children accept, while reading, while being explained."

The science comic book "Kuark" is a learning resource for teachers and learning media for students at SDIT As-Salamah Baturetno. For teachers, the science comic "Kuark" is used to study science material which is then presented to students in easy-to-understand language. As for students, the science comic "Kuark" is used as a learning medium or reading to increase knowledge about science material.

There are two functions of science learning media, namely, for teachers to assist in interpreting the content of the subject matter so that it is adequately conveyed and attracts students' attention to focus on the lessons given to cause students to think actively [25]. The science comic "Kuark" is used during private hours and is carried out once a week within one hour lesson. The material is divided weekly based on the science comic "Kuark" rubric.

The use of comic media in learning makes it easier for students to understand the material because the use of language in comics is more superficial than in conventional books. The teacher uses the lecture method to convey the material in the comics. In teaching, the lecture method is an interaction used by the teacher through verbal narrative and explanation [26].

The technique's effectiveness increases if it is accompanied by learning media, questions and answers, demonstrations, etc. The weakness of the lecture method is that it is not effective if it is used to teach skills, so the teacher uses the experimental rubric in the science comic "Kuark". The practical method involves students actively finding their facts and learning concepts through experiments [27].



Fig. 9. Summary

The teacher must accompany students' use of science comic media "Kuark." This assistance is carried out to avoid misconceptions in science content. Misconceptions are increasingly complex and stable students' prior knowledge that is not considered in learning [28]. Misconceptions can occur due to students' misunderstanding of the material being read or mistakes in understanding and lack of assistance when students study independently [29]. The teacher provides explanations and straightens students' perceptions during and outside learning. Summaries are made by teachers and students to make it easier for students to recall the material that has been explained and learned.

4 Conclusion

From the studies that have carried out, the science comic "Kuark" is used by teachers as a learning medium to make it easier for students to understand science material. Mentoring and coaching assisted by the science comic "Kuark" is carried out during private hours which is held once a week with material topics following the rubric contained in the comic pages every week. The teacher uses lecture and experimental methods when using the science comic "Kuark" to students and provides a summary to make it easier to remember the material. The contribution of this study is to describe the use of the science comic "Kuark" as a medium for learning science at SDIT As-Salamah Baturetno.

This study has limitations including the lack of breadth of questions asked by the authors to the resource persons and the lack of time for observation due to the short implementation time. The implications of this study are: First, the science comic media "Kuark" can be used as an option for teachers as a medium for learning science to students other than conventional books. Second, teachers can use it as a learning resource to understand science material to avoid misconceptions when delivering material. Third, the media fosters a love of science material in students research.

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