

The development of comic-based geometry teaching materials in an Islamic Elementary School

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Abstract:

This research aims to develop comic-based mathematics teaching materials on the material of geometry in mathematics subjects. Comic teaching materials include content that discusses the basic ability to understand the material of geometry in grade 1 Islamic elementary school. This research uses the (Research and Development) R&D approach with the ASSURE model which has 6 stages of the process, namely: analyze learners, select objectives, select media & materials, utilize media & materials, require learner participation, evaluate & revise. This research only describes the development stage, because conditions do not allow using all stages. The data collection technique used questionnaires and interviews. The data collection instrument is a validation sheet for material experts, media experts, and learning design experts. Based on the research results, 78% of the material validation results fall into the good or practical category. Media validation findings obtained 83%, so it is in the very good category. The findings of learning design expert validation with a percentage of 90% are classified in the excellent category. Thus, it can be stated that comic teaching materials on the material of geometry in the discipline of mathematics can be used in the learning process at school.

Article Info:

Submitted:

01-07-2025

Revised:

02-07-2025

Accepted:

02-07-2025

Keywords:

comic, geometry, mathematics, elementary school

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INTRODUCTION

Education is an important aspect of life that tries to empower people. Education is an important aspect because it is comparable to human resources (Wahyuni & Monica, 2016). The effectiveness of education will make the country progress toward freedom in all aspects of life (Fitriyani et al., 2022). The development of an independent and creative person during learning is a sign of the achievement of education (Febriyandani & Kowiyah, 2021). Mathematics is one of the learning subjects to fulfill human resources (Nugraheni, 2017).

According to Rismawati et al. (2022), mathematics is a subject that has the aim of finding answers to the difficulties that humans face every day, utilizing information, understanding size and shape, and counting. Educators are required to encourage learners to think and process reasoning when learning mathematics (Rusmana & Mila Kurniawarsih, 2020). Educators not only transfer knowledge to students but must provide facilities so that students can utilize logic in the learning process and provide direction for students' interpretation of the teaching and learning process, which can train positive attitudes such as cooperation in a group, confidence, courage, independence, discipline, responsibility, and other attitudes (Mujahadah et al., 2021).

One-way math transmission is still used in elementary schools. This learning is abstract and decontextualized, and centered on the educator-to-learner (Rawa & Bhoke, 2017). The situation in the field shows that the mathematics teaching materials that are still being used have several shortcomings, including the appearance of the content offered in the teaching materials, as well as the burden of teaching materials that students carry requiring students to carry printed books in each subject (Y. Fitriyani et al., 2021).

This is supported by research (Maryati & Suparman, 2018), which states that when learning mathematics, material builds space; students do not have other books, and students do not look for other teaching materials besides books provided by the school as an aid in the learning process. Students are also not given modules or textbooks that are useful for improving their ability to solve problems in the mathematics of geometry material, and it appears that educators do not utilize the media in the learning process.

An educator has the task of being able to create an effective learning environment, and students who play an active role in learning can actively ask questions and can develop their potential (Febriyandani & Kowiyah, 2021). Several factors influence how to produce a quality learning process, including how to teach, the use of methods that vary and attract students, the atmosphere and conditions of learning, the use of innovative media, and support for the learning process itself (Agustina et al., 2018).

Learning resources make it easier for learners to learn and provide more choices (Indahsari & Kintoko, 2021). The use of teaching materials must also consider the situation and conditions of the learners (Afifah Zahro' et al., 2022). The use of teaching materials encourages students to be involved and active and to retain information conveyed by educators. All types of materials are used in carrying out the teaching and learning process (Jazuli et al., 2017). Teaching materials can be grouped into several categories (interactive teaching materials) that are printed teaching materials and interactive multimedia teaching materials (Rahmawati et al., 2019).

When educators can utilize printed teaching materials and interactive multimedia teaching materials, students will be involved in learning so that they can understand and apply what the educator says, and their learning outcomes will be useful because students will understand what the educator explains (Haryadi et al., 2021).

Further research found that the existence of educators and other education personnel who are skilled in managing and utilizing teaching materials can prevent verbal teaching and learning activities because students only receive material from information symbolized by lectures from educators as a single learning source (Putra & Milenia, 2021). As a result, verbalism will arise, namely, children can quote words but do not understand the meaning/meaning contained in them. This is usually seen when the teacher gives an explanation through lectures and then asks questions; most students cannot answer the educator's questions correctly (Kristianto & Rahayu, 2020). This communication barrier will have an impact on the learning outcomes that have been set before (Munisah, 2020). Therefore, the achievement of learning outcomes is determined by the ability of educators to choose and apply learning techniques (Sutomo, 2018).

Students often feel bored with the teaching materials used, so it is necessary to develop teaching materials, which of course must pay attention to the needs and characteristics of students through the curriculum which requires students to be active in learning (Ningrum & Suparman, 2017). Teaching materials function as a guide for educators during the teaching and learning process and are the content of the competencies that students must learn. Teaching materials that can be developed for mathematics subjects of geometry material are comics (Kusumadewi et al., 2022).

Comics are pictures with interesting stories that are easy to follow and can help people understand difficult subjects (Gumilang et al., 2019). In addition, comic-based learning materials can help students develop a sense of discipline and responsibility (Saputra & Donaya, 2021).

Comics are a popular art form, especially among young people, so they have the potential to be a medium for science education and communication in the form of stories with a series of funny illustrations (Rahim et al., 2022). Comic books are popular among children and adults because they feature a basic storyline that is easy to understand (Fahrnunisa et al., 2021). Comics can be used as messengers in various subjects. Because of its attractive appearance, the format in comics is often given a serious explanation that is merely entertainment. In general, comic teaching materials can encourage students and increase their enthusiasm for learning (Saputri et al., 2020).

Comics are classified into two types based on their function: commercial comics and instructional comics. Commercial comics are very important in the market because they are individualized, provide funny stories, and are packaged with conversational and market language (Dewi & Surur, 2021). Meanwhile, instructional comics are known for their useful substance. Industries, health institutions, non-profit organizations, and other groups produce a large number of instructional comics (Nurhayati et al., 2018).

The making of comic-based teaching materials is expected to help students understand mathematics subjects related to geometry. Thus, the purpose of this research is to make comic teaching materials as a tool in the learning process that can be used by educators to convey material, students to learn the material, and parents to accompany their children to study at home.

METHOD

This research uses the Research and Development (R&D) approach, with the ASSURE model. This research aims to produce teaching materials for math comics on the material of geometry in grade I elementary school. The ASSURE model has 6 stages of the process, namely: analyze learners, select objectives, select media & materials, utilize media & materials, require learner participation, evaluate & revise. The diagram of the ASSURE model stages is as follows:

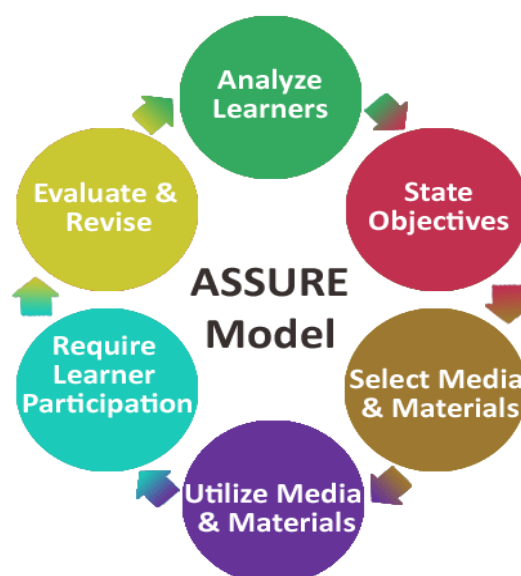


Figure 1. ASSURE Model Stages

The data analysis technique in this study is data collection using instruments, which are then processed using research and development steps. The results of the expert validation data were analyzed using a Likert Scale instrument. The score results are then calculated using the formula for percentage. The percentage results are interpreted as presented in Table 1.

Table 1. Criteria for validity

Score	Criteria
0%-20%	Not good
21%-40%	Fairly good
41%-60%	Enough
61%-80%	Good
81%-100%	Very good

(Dewi & Surur, 2021)

RESULT

Analyze Learners

The first action to be taken by any researcher, especially development research, needs analysis. The purpose of this analysis is to determine why a learning teaching material design is made. Interviews with grade 1 Islamic elementary school educators were used to obtain data to assess the needs of learners.

The characteristics of students in grade 1 Islamic elementary school include children who are still in the developing stage and like to be active, according to various responses from teachers who handle and educate students who are still in grade 1 Islamic elementary school. Children in grade 1 would rather play than learn, and they would rather observe things than count them. Saturation and boredom are at their highest. He can learn logical and abstract tactics at his age, but he cannot yet think concretely. In addition, due to the lack of learning media that supports the delivery of learning materials, the only media used are student books and educator books, with student books containing a lot of text and a few accompanying images

Select Objectives

The next stage of the ASSURE model is to define objectives and standards. As a result, it is believed that learners will acquire certain aptitudes and abilities through learning. The following are the findings of the learning analysis. The first stage is to develop objectives for the use of learning materials to assess the achievement of standards and learning objectives using the ABCD framework:

Audience

The audience is the object of the teaching and learning process. The researcher's target audience is 1st grade students. The proposed instruction focuses on teaching resources that incorporate comic books.

Behavior

Learning behavior appears in the actions of learners in the learning process. Behavior is the actions and activities of a process. Grade 1 learners have high curiosity and enthusiasm for new experiences. Grade 1 Islamic elementary school students continue to struggle to answer math problems in the form of abstract problems, so it is hoped that there will be a shift from not understanding to understanding, and those who are less interested in learning mathematics can

increase their interest in learning mathematics by solving math problems in the form of story problems using comic teaching materials.

Condition

During the observation, the researcher saw that the condition of students when receiving lessons from educators was very diverse; some were paying attention to the educator's explanation, and some were playing alone. Package books are still used in the teaching materials of educators at this time. This will be the basis for researchers to create comedy learning resources for grade 1 Islamic elementary school students.

Degree

In terms of learning objectives, this title tries to compare the situation before and after learning by using comic teaching materials made by researchers. Based on the review of the learning objectives, students are expected to achieve the learning objectives at the end of the learning process.

1. The following are the learning objectives achieved by adopting the ABCD model in making comic teaching materials for grade 1 Islamic elementary school:
2. Learners can identify objects in the shape of balls, tubes, blocks, and cubes through comics correctly.
3. Learners can categorize concrete objects based on the shape of the building appropriately.

Select Media & Materials

The third stage of effective learning planning is choosing appropriate techniques, media, and learning resources. The learning technique chosen by the researcher is learner-centered, with comedic teaching materials used to attract the attention and sympathy of grade 1 Islamic elementary school children. Researchers chose funny teaching materials, including educators, father, mother, Diana, Kak Litsa, and classmates, as well as stories about school activities that are coupled with daily activities. Comics are made using modern and everyday characters and will be combined with mathematical information according to the current curriculum, resulting in comics.

Utilize Media & Materials

The fourth stage involves the application of technology, media, and materials. At this stage, researchers used PowerPoint to create comics from grade 1 space-building material. The printed teaching materials used are illustrated comics, and the material used is the material for geometry in grade 1 mathematics subjects.



Figure 1. Home Page View



Figure 2. Before Revision



Figure 3. After Revision

Require Learner Participation

At this stage, the instructional materials created will be used in the classroom by involving students. Learners will be involved in the use of comic teaching materials so that the material can be quickly accessed or opened with the help of educators.

Evaluate & Revise

After making comic teaching materials, the next evaluation is carried out. Material expert tests, media expert tests, and learning design expert tests are used to test the practicality of comic teaching materials before they are used in learning. If product changes are still needed after the validation instrument is carried out, the validator will provide improvement ideas as a reference.

The material validation results obtained 78% which is included in the good or feasible category. Comic learning media for space topics are useful and can be used with some adjustments. The results of media validation obtained 83%, including in the very good or practical category. Comic teaching materials for geometry are effective and can be used after making changes. The results of learning design expert validation, with a score of 72 and a percentage of 90% are classified in the very good or practical category. Thus, it can be stated that comic teaching materials can be used in the learning process in the classroom.

DISCUSSION

This is supported by the findings of (Nadiyah et al., 2019), who emphasized that mathematics learning at the elementary school level no longer needs to rely on monotonous, traditional methods. Conventional approaches such as lectures or one-way communication from educators to students tend to be less effective in maintaining learners' engagement, particularly for young children who are naturally inclined toward interactive and visual learning. In contrast, math comics offer an alternative instructional medium that integrates storytelling, humor, and visual representation, making abstract mathematical concepts more accessible and enjoyable. These comics not only serve as instructional tools for teachers but also as supplementary learning resources for parents to support their children's education at home.

At the elementary level, arithmetic and geometry concepts can be effectively conveyed through comic narratives. By embedding mathematical content within storylines and contextual dialogues, students are more likely to relate to the problems presented, which in turn facilitates better comprehension and retention. Educators and parents alike can leverage this format to deliver concepts and mathematical symbols in a more relatable and less intimidating way.

This is consistent with the argument presented by Sundayana (2016), who asserts that media can play a crucial role in transforming abstract mathematical concepts into more concrete, understandable forms. Comics, in this context, become not just a source of entertainment but a cognitive bridge that connects abstract theory with visual experience. For instance, the introduction of geometric figures, which are often taught using rigid and abstract formulas, can be made more tangible by presenting them in realistic, everyday scenarios within comic panels. This not only aids in visualization but also encourages spatial reasoning and deeper conceptual understanding among young learners.

However, despite these pedagogical advantages, the development and implementation of comic-based teaching materials are not without limitations. One of the primary challenges is the high production cost, especially when full-color printing and professional illustration are required. Additionally, accessibility remains an issue; students from certain backgrounds may have limited

opportunities to interact with such media, particularly if the comics are only available in printed format. Moreover, not all students are familiar with using comics as a structured educational tool, and thus, guided facilitation from teachers is essential to help them navigate and make the most of the content.

In addressing these limitations, the use of digital comics in PDF format presents a practical and innovative solution. Digital versions significantly reduce production and distribution costs, making them more accessible to a wider range of students and educators. Furthermore, they can be easily integrated into digital learning platforms, enabling flexibility in both online and offline instructional contexts. This digital approach not only supports more sustainable learning practices but also aligns with the increasing shift toward technology-enhanced education.

In sum, while there are challenges to be acknowledged, the integration of comic-based materials in elementary mathematics education demonstrates substantial promise. By transforming static content into dynamic, relatable stories, these materials can enhance learners' motivation, conceptual understanding, and overall learning experience. Future efforts should focus on optimizing the design, accessibility, and teacher training related to comic-based instruction, ensuring it becomes a mainstream pedagogical approach in early childhood and primary education.

CONCLUSION

Based on the research findings, it can be concluded that comic-based mathematics teaching materials developed through several stages in the ASSURE model obtained 78% of material validation results in the good or practical category. Media validation findings obtained 83%, so it is in the very good category. The findings of learning design expert validation, with a percentage of 90% are classified in the excellent category. Thus, it can be stated that comic teaching materials on the material of geometry in the discipline of mathematics can be used in the learning process at school. So that the making of comic teaching materials for grade 1 Islamic elementary school space building materials tries to offer a complete explanation of the process of making mathematics teaching materials. The making of this teaching material produces teaching materials that are humorous for grade 1 Islamic elementary school, which includes two basic skills. In addition, students can use this media to be more enthusiastic and not monotonous.

Suggestions that can be given by researchers in the use and development of future products are as follows: to save the cost of duplicating to duplicate this comic teaching material for geometry, educators and students can use it in soft copy form and can be utilized in soft copy form.

ACKNOWLEDGEMENT

While preparing this manuscript, we are fully aware that the completion of this article is inseparable from the support, encouragement, and guidance of various parties. Therefore, we would like to thank the principals and Islamic elementary school teachers, and friends from Universitas Islam Cordoba Banyuwangi.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article. The research was conducted independently and was not influenced by any financial, personal, or institutional relationships that could have appeared to affect the objectivity or integrity of the study.

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