Journal of Education and Teaching Learning (JETL)
Volume 6, Issue 1, January 2024
Journal Homepage:
http://pusdikra-publishing.com/index.php/jetl

Development of Comics Based on the Local Wisdom North Sumatra Culture in the Mathematics Subject Geometry Material in Elementary School

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ARTICLE INFO
Article history:
Received
05 December 2023
Revised
25 December 2023
Accepted
15 January 2024

ABSTRACT

This research addresses the inadequacy of existing teaching materials in elementary school mathematics, particularly in Medan, Indonesia, by proposing the development of a Comic-Based Local Wisdom of North Sumatra Media for Geometry Learning in Grade 5. Current materials lack a focus on local wisdom and fail to align with the diverse cultural context. The research utilizes a modified 5D model, involving (1) Define, (2) Design, (3) Development, (4) Effectiveness Testing, and (5) Dissemination. The study emphasizes the importance of incorporating local traditions and cultural elements into teaching materials to enhance students' interest and understanding. The comic-based media integrates geometry concepts with North Sumatran culture, offering an alternative and engaging learning tool. The validation process involves content experts, media experts, and learning experts, all of whom declare the developed media highly suitable for instructional use. The locally-based wisdom comic media proves effective in making the learning process more engaging and facilitating students' comprehension, contributing to the improvement of mathematics education in elementary schools.

Key Word *Comics, Local Wisdown, Culture, Geometry, Material*
How to cite https://pusdikra-publishing.com/index.php/jetl
Doi 10.51178/jetl.v6i1.1733

INTRODUCTION

The use of teaching materials in elementary school mathematics still relies on materials from publishers that have not been able to introduce the richness of the local culture around the students, particularly in the city of Medan. The content in these teaching materials has a weakness, namely a lack of focus on local wisdom in the specific region of Medan (Maghfiroh & Hardini, 2021; Rulyansah & Sholihati, 2018). (Krisna et al., 2020) Meanwhile, the current elementary school curriculum in Indonesia emphasizes the affective aspects of students for the sustainability of national development.

Good teaching materials have criteria such as alignment with the curriculum. The development of teaching materials must be based on the

applicable curriculum, taking into account the students' conditions in the field. The development should also consider the needs of the students to be achieved. Essentially, there are teaching materials intentionally designed for learning, and there are those not specifically created but can be utilized for learning. These non-specifically created teaching materials are usually used as supplements or additions in learning tailored to the students' needs (Hartono & Noto, 2017; Septian et al., 2019).

(Jahuri et al., 2023) The presentation of the books is unattractive, leading to a very low focus and interest of students. Students quickly become bored with teaching materials that have monotonous and less communicative learning. The themes used in the learning materials are not suitable for the students' conditions. (Sopiah, 2021) There is also a lack of interesting instructional media for geometry-related topics, especially those based on local wisdom in the form of comics. The utilization of instructional media is still limited for students because teachers only convey materials using visual aids such as pictures in student workbooks, and the development of comic-based instructional media has not been undertaken.

In the case of Geometry learning, this basic competence highlights the culture of North Sumatra located in the city of Medan. North Sumatra is a multi-ethnic province with Malay, Batak (Toba, Simalungun, Karo, Angkola, Mandailing, Pakpak, Alas), and Nias as the indigenous population. Additionally, there are also immigrant communities in this province, such as Acehnese, Javanese, and Minangkabau. The connection of geometric learning to the Sumatran tribes can be observed through traditional games. Teaching materials in geometry can be created with traditional play models, such as "ombus obus" cakes and "nasi tumpeng."

Students need alternative teaching materials that incorporate local wisdom, especially culture, to broaden their knowledge. Alternative teaching materials can be derived by utilizing the surroundings of the students as additional teaching materials. Introducing the richness of local wisdom, such as traditions in North Sumatra, makes students feel a sense of cultural ownership, leading to a desire to learn or preserve it.

Local wisdom itself is a habit that lives and develops in the community's life in a particular area. Local wisdom is distinctive and regional because it is only practiced by a specific community. The value of local wisdom usually becomes ingrained through a lengthy process of application in daily life. The easiest way to preserve the values of local wisdom is through education in schools. The development of teaching materials that incorporate local wisdom in the students' learning environment is crucial, given the lack of learning

methods regarding traditions in Medan. The use of geometry learning is justified to serve as a means of preserving the forms used in traditional food in North Sumatra. Considering the declining interest in traditional food due to the influx of modern foods, using traditional foods in geometry learning in North Sumatra is meaningful. Furthermore, there is currently no written documentation regarding comic-based instructional media that incorporate local wisdom in geometry learning at the elementary school level.

RESEARCH METHODE

This research is a development study aimed at producing a product in the form of a Comic-Based Local Wisdom of North Sumatra Media Development for Geometry Learning in Grade 5. The study utilizes the Research and Development (R&D) model with the 5D model extension, which includes Preliminary Research, Model Development, Model Validation, Model Effectiveness Testing, and Dissemination. The research and development procedure follows the 5D model, consisting of four main stages: (1) Preliminary Research, (2) Model Development, (3) Model Validation, (4) Model Effectiveness Testing, and (5) Dissemination (Sugiyono, 2012).

RESULT AND DISSCUSSION

This research is a development study aimed at achieving predetermined objectives. The researcher conducted a development study of instructional materials using the 4D development model by Thiagarajan, which has been modified into a 5D model as explained in Chapter III, comprising (1) Preliminary Research, (2) Model Development, (3) Model Validation, (4) Model Effectiveness Testing, and (5) Dissemination. From the stages of this research and development, the following results were obtained:

Description of the Learning Device Development Stage

The author searches for images that need to be adjusted to the material. Several design processes are carried out to create a comic medium. The first step is to sketch comic images, followed by the creation or design of a comic for geometry material. After that, the editing process continues using the Canva application as the editing medium in comic creation so that it can be printed according to the desired size.

Journal of Education and Teaching Learning (JETL)
Volume 6, Issue 1, January 2024
Page 1-12

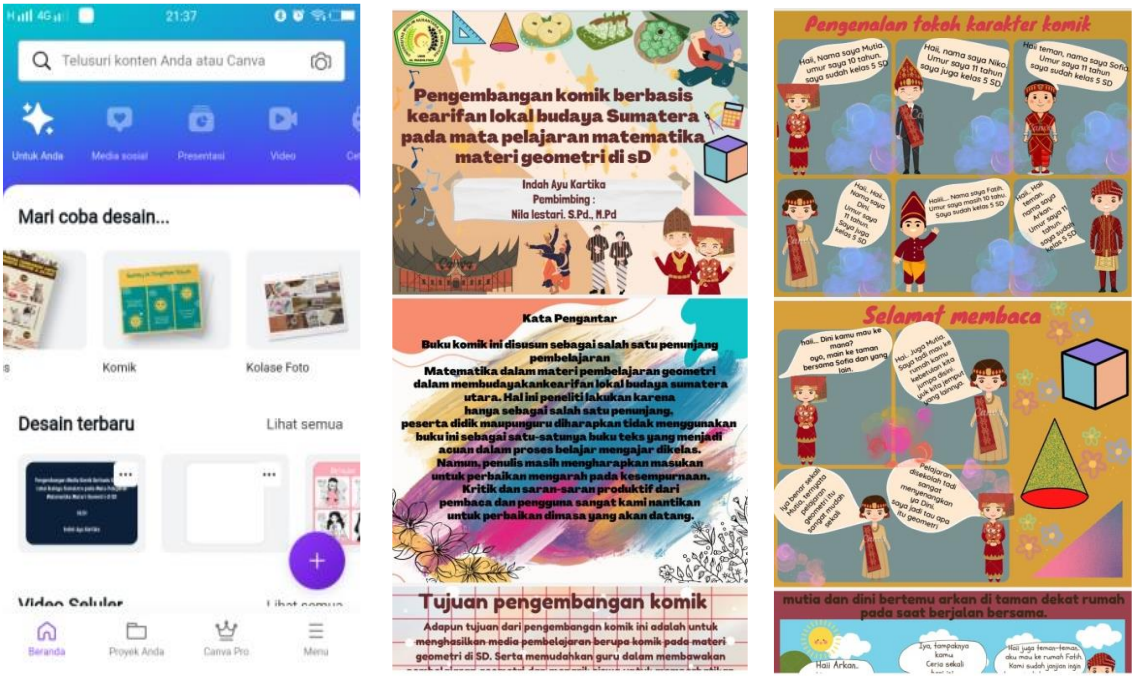

Figure 1.
Using Canva in Making Local Wisdom Comics

After going through the design creation process, editing, and turning the images into a comic with a storyline that provides an engaging effect and visually interesting narrative, starting from the readable appearance of the images from the first page, the character-based comic medium is now ready to be used as a learning tool.

Once the media is completed, the next step is the third stage of the 5D development model, which is the development stage. This stage aims to assess the feasibility of the local wisdom-based geometry comic medium. After obtaining the feasibility assessment, if there are revisions suggested by the comic media experts, they are revised according to the criticisms and suggestions provided by the validators. The validators consist of two lecturers and one fifth-grade teacher, namely the subject matter expert Dr. Juliandi Siregar, M.Sc., media expert Arrini Shabrina Anshor, and learning expert Class V teacher Aditya Fitri Lubis, S.Pd. Validation is done by directly approaching the experts to assess and validate the product created by the researcher, showing them the product to get direct feedback. The validators, according to their expertise, are asked to evaluate it so that weaknesses and strengths can be identified. The validation results from the experts, in the form of suggestions and comments for revisions, are used to revise the local wisdom-based comic media that has been created. If there are no revisions needed, the comic media product is considered suitable for use.

After the product is developed according to the planned design, the next stage is to assess (validate) by media and subject matter experts. This validation is done to obtain data on the feasibility of the developed comic media. The validation by subject matter and media experts aims to receive criticism, information, and suggestions for improvement on the comic media in mathematics geometry learning.

Through the validation results from the subject matter expert, it is revealed that out of 18 questions, there are 10 "yes" assessments and 8 "no" assessments. This indicates that the media expert considers the comic medium suitable for study and as a learning tool in mathematics, specifically for geometry. Despite the media expert stating that the comic medium is suitable, there are some conditions for improvement that need to be revised by the researcher. The suggestions and criticisms from the media expert include "improve the writing of names, improve the writing of numbers." Based on these suggestions and criticisms from the media expert, the researcher will make further revisions to the product to ensure its quality.

Considering the overall validation results from both the subject matter expert and the teacher, it can be concluded that the comic media developed for mathematics learning has shown good quality development and is highly suitable for trial use. This is evidenced by the assessments obtained from the initial product and the revised product, which experienced an increase in evaluations from both the subject matter expert and the teacher. Overall, they state that the assessment aspects of the locally-based comic media developed have the necessary categories that a developed product should possess.

Discussion

This study is a Research and Development (R&D) study that resulted in a character-based comic media product for the topic of fractions in mathematics learning. The development of character-based comic media is based on the 4D development model developed by Thiagarajan (1974), consisting of four stages: (1) Define, (2) Design, (3) Development, and (4) Test Effectiveness. In the theory explained in Chapter III, the researcher has modified the 4D development model into a 5D model. It is stated that in this stage, the research is only carried out until the Development stage because the research problem is limited to the suitability or unsuitability of the locally-based comic media developed. Therefore, the dissemination stage is not conducted.

The development of media is carried out in several stages. Initially, the researcher selected the material based on Core Competencies, Basic Competencies, indicators, and the fifth-grade textbook. After selecting the material, the researcher designed the character-based comic learning media.

The locally-based comic media designed is then assembled according to the comic storytelling system used. The completed locally-based comic learning media is then validated by three validators: a subject matter expert (lecturer), a media expert (lecturer), and a learning expert (response from a fifth-grade teacher).

The validation results by the subject matter expert indicate assessments on the aspects of material suitability with Basic Competencies, covering the alignment of geometry material with basic competencies and indicators to be achieved by students, showing a "yes" (good) response. The geometry material is taken from the teacher's book and student book for Grade V Elementary School 2013 curriculum revision 2018, and it is suitable for the learning objectives, indicating a "yes" (good) response. The assessment of the accuracy of the material, including the presentation of material in the locally-based comic, aligned with the curriculum, indicates a "yes" (good) response. The correctness of geometry concepts/material in learning also shows a "yes" (good) response. The geometry material is taken based on the teacher's book and student book for Grade V Elementary School 2013 curriculum revision 2018.

The order of presentation of fraction material in learning shows a "yes" (good) assessment response, geometry material is sorted from KI, KD, a general explanation of geometry and examples and material in character-based comics is relevant to the material that must be studied shows a "yes" assessment response (Good). Assessment of the up-to-date aspect of the material includes activities presented in the media developed which can foster students' curiosity showing a "yes" (good) assessment response. With the presence of local wisdom-based comic media developed it will make the learning process more interesting and can foster students' curiosity.

Ease of understanding geometry material in learning shows an assessment response of "yes" (good), the geometry material presented is adjusted to the student's level of understanding based on the student's characteristics in understanding learning and the sequence of learning material in accordance with the student's train of thought showing an assessment response of "yes" (Good). The assessment of aspects of suitability to student development includes material in local wisdom-based comic media that is appropriate to the student's level of development showing an assessment response of "yes" (good), by using local wisdom-based comic media it is easier for students to understand the material presented showing an assessment response of "yes" (good). yes" (good), the suitability of the learning material to the level of ability of students shows an assessment response of "yes" (good), the direct interaction of the media with students shows an assessment response of "yes" (good) and the

delivery of material on the media is interesting for students to understand. indicates an assessment response of "yes" (good).

The assessment of the suitability aspect for the students' development includes the material in the locally wise-based comic media being appropriate for the students' developmental level, showing a positive response with a "yes" (good) assessment. By using locally wise-based comic media, students find it easier to comprehend the presented material, indicating a positive "yes" (good) assessment. The alignment of the learning material with the students' ability level also shows a positive "yes" (good) assessment. The direct interaction of the media with the students elicits a positive "yes" (good) response. The delivery of material through the media is engaging and understandable for students, as indicated by a positive "yes" (good) assessment.

The assessment of the presentation and language aspects includes the appropriate use of images and design in locally wise-based comic media, aligning well with the material and receiving a positive "yes" (good) assessment. The use of colors in locally wise-based comic media is appealing to students, showing a positive "yes" (good) assessment. A variety of bright colors are chosen for creating locally wise-based comic media.

The clarity of sentences on the media being easily understood by students is positively assessed with a "yes" (good) response. The selection of words and sentences must adhere to proper Indonesian language rules that are easy for students to understand, receiving a positive "yes" (good) assessment. The sentences used in the media clearly conform to Indonesian language rules, as indicated by a positive "yes" (good) assessment. With the validator's input stating, "This media is engaging and serves as a learning/basic education tool. This media is suitable for use in the teaching and learning process at school," the locally wise-based comic media on the topic of fractions meets the criteria for being valid or suitable.

The validation results by media experts provide assessments on the visual design aspects of locally wise-based comic media. The media accurately depicts the content/teaching material in line with everyday life illustrations, receiving a highly positive "yes" (excellent) assessment. The visual presentation of locally wise-based comic media creates a positive impression, effectively capturing the students' attention for learning, indicated by a highly positive "yes" (excellent) assessment. The chosen images in locally wise-based comic media, besides being aligned with geometry material, also contribute positively to students. The colors used in the media are highly suitable, with good contrast between them, as reflected in the highly positive "yes" (excellent) assessment. The images used in the media are clear and meet the students' needs, earning a highly

positive "yes" (excellent) assessment. The color scheme and background used in locally wise-based comic media employ an attractive combination, indicating a highly positive "yes" (excellent) assessment. The visual elements are designed to be as engaging as possible to prevent students from feeling bored during lessons, and the font type used is clear and readable, receiving a highly positive "yes" (excellent) assessment.

The assessment of language aspects includes the use of Indonesian language in accordance with the Enhanced Spelling (EYD), showing a highly positive "yes" (excellent) response. Indonesian is considered a unifying language, and its use adheres to the EYD, making it easy for students to understand. The sentences used in the media are easily comprehensible to students, resulting in a highly positive "yes" (excellent) assessment. The politeness in language usage also receives a highly positive "yes" (excellent) assessment. In addition to using language in line with the Enhanced Spelling (EYD) and suitable for students' characteristics, selecting polite language for learning is crucial.

The assessment of media aspects in learning includes the alignment of image presentation and discussed material, showing a highly positive "yes" (excellent) response. The presentation of locally wise-based comic media is done sequentially, earning a highly positive "yes" (excellent) assessment. The locally wise-based character-developed comic media is structured according to the geometry material sequence. The presentation of locally wise-based comic media supports students in actively participating in learning, as reflected in the highly positive "yes" (excellent) assessment. With the existence of character-based locally wise comic media, students can utilize it interactively because there are sections that demand their participation.

Comic media based on local wisdom developed to be engaging and user-friendly in elementary school mathematics learning shows positive assessments, with responses indicating "yes" (very good). The developed media can be used as an alternative learning tool, as responses also indicate "yes" (very good). The ability of locally-based wisdom comic media to foster students' curiosity and create a learning spirit is also positively assessed with a response of "yes" (very good).

The input from the validator states, "Comic media based on local wisdom with geometry developed by a student named Indah Ayu Kartika is highly suitable for implementation as an initial step in determining the effectiveness of the media on students' understanding of fractions at the elementary school level." Thus, locally-based wisdom comic media on geometry meets the criteria of being valid or highly suitable.

The validation results from learning experts, specifically the response from a fourth-grade teacher, assess the presentation aspect of locally-based wisdom comic media. This includes the alignment of the material in the media with the core content in the Basic Competence, receiving positive assessments with responses indicating "yes" (very good). The material on Pancasila is taken from the teacher's book and the fifth-grade student's book, following the 2013 curriculum revision in 2018.

The alignment of the presented material in locally-based wisdom comic media with the learning objectives receives positive assessments with responses indicating "yes" (very good). The Pancasila material is considered suitable for the formulated learning objectives. The ease of understanding the presented material through character-based comic media is positively assessed with a response of "yes" (very good). The locally-based wisdom comic media is developed to be as interesting as possible to attract students' interest in learning geometry.

The material presented in the media is in line with the students' ability level, as evidenced by the positive assessment response of "yes" (very good). The choice of geometry material is aligned with the thinking criteria of fifth-grade elementary school students, and the character-based comic learning media on geometry is easily understood and related to everyday life, as indicated by the positive assessment response of "yes" (very good). The locally-based wisdom comic media uses images that depict everyday life to help students better understand geometry concepts.

The assessment of the appearance aspect of character-based comic media includes the use of locally-based wisdom comic media with sentences that are easily understood by students, receiving a positive assessment response of "yes" (very good). Sentences in locally-based wisdom comic media are simplified to be very simple so that students can better understand the geometry material being studied. The attractiveness of the appearance of character-based comic media for learning by students is positively assessed with a response of "yes" (very good). Locally-based wisdom comic media is developed to be as attractive as possible to capture students' interest in learning.

The clarity of writing in locally-based wisdom comic media is positively assessed with a response of "yes" (very good). The coherence of the material in accordance with the students' thought process receives a positive assessment response of "yes" (very good). The alignment of geometry material with comic media and the developmental level of students shows a positive assessment response of "yes" (very good). The direct interaction of the media with students receives a positive assessment response of "yes" (very good). By using

character-based comic media with local wisdom, students find it easier to understand the conveyed material, as indicated by the positive assessment response of "yes" (very good).

The alignment of learning material with students' ability levels receives a positive assessment response of "yes" (very good). The ability of the media to create a sense of enjoyment in students during learning is positively assessed with a response of "yes" (very good). The engaging images at the beginning of the pages make students feel happy and enthusiastic about participating in the learning process. The media's ability to create a sense of enthusiasm in students is positively assessed with a response of "yes" (very good).

With input from the validator stating, "Comic media based on local wisdom with the topic 'Let's Get to Know Geometry,' developed by Indah Ayu Kartika, is already very suitable and can be implemented as an initial step for the teaching and learning process in schools." Therefore, locally-based wisdom comic media on the topic of geometry meets the criteria of being valid or highly suitable. This success is attributed to various benefits and advantages possessed by character-based comic media. Locally-based wisdom comic media has various benefits in the teaching and learning process (Anisa Noverita et al., 2023; Ni Made Santi Ayuni et al., 2023).

Locally-based wisdom comic media is considered one of the effective and interactive strategies in learning activities. It visually depicts and helps students experience the responsibilities and local wisdom present in our lives. It adds new experiences to daily activities and provides an opportunity for students to participate in teaching and learning activities using comic media (Fauza et al., 2023; Jahuri et al., 2023; Ngazizah et al., 2022).

Based on the above discussion, it can be concluded that the locally-based wisdom comic media product on the topic of geometry in elementary school mathematics learning, developed by the researcher, is declared valid or highly suitable. There were no revisions suggested by experts, and the locally-based wisdom comic media developed is highly suitable for instructional material in learning. The engaging locally-based wisdom comic media with visualizable content can make the learning process more effective, enhance enthusiasm for learning, and greatly assist in delivering content, especially in mathematics education. The locally-based wisdom comic media, being concrete and real, can be used directly in teaching and learning.

CONCLUSION

Based on the research and development conducted by the researcher, it can be concluded that the research and development utilized stages with a

modified 5D model, incorporating the steps of (1) Define (Definition), (2) Design, (3) Development, (4) effectiveness testing, and (5) Dissemination, focusing on the creation of a comic-based media on local wisdom in North Sumatra for mathematics learning in elementary school geometry.

The comic-based media on local wisdom in North Sumatra exhibits several advantages. Apart from being visually appealing with diverse and engaging storytelling images, the media is not monotonous. Students can also actively engage with the locally-based wisdom comic media interactively, involving them directly in using the media for various parts that require their participation.

Based on the media's feasibility from input by content experts (lecturers), media experts (lecturers), and learning experts (responses from fifth-grade teachers), the developed character-based comic media on geometry by the researcher is declared highly suitable for use as instructional material in the learning process, according to the validation data.

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