

# Development of Nyale Worms Science Comics as Learning Media Supporting Biology Material in Junior High Schools

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**Abstract:** Media that discusses Nyale worm material in detail and clearly has never been developed before. This research aims to develop Nyale worm science comics as supporting media for biology learning in schools. The type of research used is research and development (R&D) using the Plomp model which consists of 5 stages. However, this research was only carried out up to stage 4, namely preliminary investigation, design, realization/construction, as well as tests, evaluation and revision. The subjects of this research were MTs Nurul Jannah students for the 2022/2023 academic year, totaling 35 students. The data collection technique uses a questionnaire sheet to obtain validity data and student responses. The data obtained was then analyzed descriptively. The research results show that science comics and nyale worms received an average of 83.93% based on material experts, 91.20% based on media experts with a very decent category. Based on user responses, the Nyale Worms comic received a score of 71.92% in the decent category. This research concludes that the Nyale worm science comic is suitable for use in the learning process to increase students' interest in learning.

**Keywords:** Biology learning media; Nyale worms; Science comic

## Introduction

Indonesia is an archipelagic country that is rich in flora, fauna, and culture. Each region has its own unique regional story which has been told from generation to generation, and this is also the case on the island of Lombok. The story in Lombok, Putri Nyale, is a story that is familiar to every Lombok community. The story tells of a king's daughter who drowned herself in the sea to avoid a war between princes who wanted to marry the princess. The princess's hair transformed into worms called Nyale worms. So, to this day Nyale is the incarnation of princess hair and is also known by students as Nyale's daughter.

In scientific research, nyale worms are polychaete worms that produce nyale (epitoke). Nyale is the back part of the worm's body which has a special function for reproduction, which is released into the water for external fertilization (Bachtiar et al., 2020). Nyale worms

belong to the Phylum Polychaeta. Polychaetes on Lombok Island consist of 13 species, but only three species have been identified as nyale worms, namely *Lysidice collaris*, *Eunice (Palola) siciliensis*, and *Dendronereides heteropoda* (Jekti et al., 1993).

Every year on Lombok Island the Bau Nyale tradition is carried out. This activity could be a threat to the preservation of Nyale worms. According to Bachtiar et al. (2016), the adoption of the Bau Nyale tradition has exceeded capacity. The Bau Nyale activity was attended by approximately 27.000 people with a catch value of 1.30 tons. Excessive fishing of nyale worms will reduce the rate of fertilization and recruitment of nyale worms, thereby threatening the sustainability of the nyale worm population.

This scientific understanding also needs to be instilled in students from an early age without having to erase the folklore they hear. Presentation of scientific information can be made in the form of textbooks,

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modules, articles, encyclopedia or science comics. All types of reading have their characteristics and characteristics that can be used as learning media.

Comic media can be used as an alternative learning media if teachers find it difficult to provide direct learning experiences to students. Comics have certain characters that can make something more popular and easier to understand. Apart from that, according to (Trimo, 1997) comics have several advantages, there are increasing the reader's vocabulary, making it easier for students to grasp things or formulas that are invisible to the eye, and can develop children's interest in reading. Research results also showed that comic media can improve learning outcomes (Aisyah & Setiawan, 2023; Amali et al., 2023; Indriyani et al., 2024; Nada et al., 2019; Nasution et al., 2023), science literacy (Mutiarames & Fitria, 2022), learning interest (Fatimah & Fatonah, 2023), creative thinking ability (Praptiwi et al., 2021), learning motivation and understanding concept (Safarati & Zuhra, 2023; Sukri, 2023).

Based on the results of interviews with 30 students, 100% of students stated that they preferred reading comics rather than reading textbooks, as well as research results from Muyassaroh et al. (2021) which stated that 36% of students liked comics. According to Latifah et al. (2015) the learning media mostly uses textbooks, which have not had a significant influence on increasing students' reading interest, and makes student activity and learning outcomes low.

Comic media has been developed by many previous researchers including human blood circulation (Aisyah & Setiawan, 2023; Sukma & Setyasto, 2024), environmental disaster mitigation and mitigation (Yani et al., 2023), environmental conservation (Indriyani et al., 2024), global warming (Safarati & Zuhra, 2023), human respiratory system (Rahayuningsih & Setiawan, 2023), nervous system (Wahyuningsih, 2012), and probability material (Septy et al., 2015). However, the development of comic media using nyale worm material has never been carried out. There are also no various types of media or other teaching materials that explain nyale worm material in detail and clearly. This is confirmed by the research results of Bachtiar et al. (2020) that 100% of teachers have never read about nyale worms from books and modules. Information was also obtained that 95% of teachers had never read material about nyale worms from scientific articles or newspapers and 5% of teachers obtained information about nyale worms from articles and newspapers, which had an impact on students' lack of knowledge about nyale. In fact, nyale worms are one of the local wisdom found in Lombok. So there is a need for learning media that can be used by students to study nyale worms.

The nyale worm comic that was developed has several advantages, including presenting lots of pictures

so that it can attract students in reading, the story line is adapted to traditions that occur in Lombok so that learning will be more meaningful, and visualization in the comic can help students understand complex concepts more easily. For this reason, it is important to develop nyale worm science comics in biology subjects, which are expected to increase students' understanding.

## Method

The type of research carried out is research and development (R&D). The product developed in this research is the Nyale worm science comic. The comic development model was adapted from the Plomp (2010) model which consists of 5 stages, there are preliminary investigation phase, design phase, realization/ construction phase; test, evaluation and revision phase, and implementation phase as shown in Figure 1. However, it is reported in this article that it reaches stage 4.

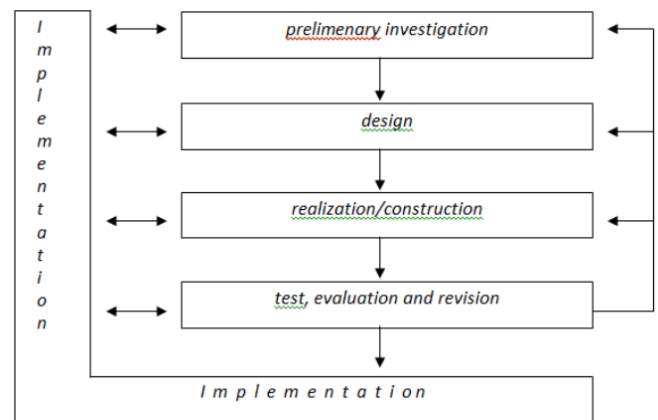


Figure 1. Plomp development model (Plomp, 2010)

The initial investigation stage is the first stage in product development. This stage assesses the rational reasons for the importance of comic development and analyzes the needs of comics by distributing questionnaires to students. The second stage is design, which is carried out by designing activities in the form of characters, comic characters, and storylines from comics. The third stage is realization/construction which aims to produce an initial draft of comics referred to as prototype 1. Furthermore, at the test, evaluation, and revision stage, comic validation activities were carried out by expert validators related to comic content and media validators. The comics were revised based on the suggestions obtained from the validators, and the revised comics were referred to as prototype II. At this stage, a limited trial was also conducted to obtain data on the results of student validation in a limited class of 20 students.

This research was carried out in September in Semester I (odd) of the 2022/2023 academic year, at junior high schools in Mataram City. The subjects in this research were 50 class VII students, MTS Nurul.

Instruments for collecting data in developing learning tools include student questionnaires and product development validation sheets. The student questionnaire is distributed to gather information related to students' use and interest in comics. The product development validation sheet consists of three parts there are a comic media expert validation sheet, a material expert validation sheet, and an audience validation sheet (for students/users).

The data obtained in the research includes media expert validation data, material expert validation, and user validation. Next, it was analyzed descriptively. The validation data is converted into a scale as presented in Table 1.

**Table 1.** Eligibility Criteria for Science Comics (Akbar, 2015)

Criteria for achieving eligibility scores (%)	Eligibility level
81.00 - 100.00	Very feasible
61.00 - 80.00	Feasible
41.00 - 60.00	Feasible enough
21.00 - 40.00	Less feasible
00.00 - 20.00	Not feasible

**Result and Discussion**

The results of a preliminary study of 30 junior high school students showed that 100% of junior high school students had a much higher interest in reading comic books than reading textbooks, and also preferred buying comics rather than textbooks. This statement is in accordance with that stated by Dwiputra et al. (2020) that the use of comics as a learning medium to increase student interest is not a foreign phenomenon. In comics, learning material is presented in the form of images so that it can help students understand the material presented. Research results also show that the use of images can attract students' attention, make students enjoy and want to participate in the learning process (Khafidhoh, 2019).

The design stage is carried out by designing the characters, character traits and comic storyline. Characters are visualized in the form of images that can attract students' attention. The characters in each figure are presented in Figure 2. The characters are created based on the characters of school or junior high school children in general who are highly curious, like to explore and share easily. Character development must be following the goals for whom the comic is made and for what purpose the comic is made. So, the characters in the story must match the theme. Character depictions

from comics are created by imagining or imagining characters based on the story theme.

Next, a storyline from the comic was developed with the following plot: "Baiq Salma is a native Sasak girl who lives in Pujut District, Central Lombok Regency. She is a class VII student at SMP Negeri 1 Pujut. At her school, she is one of the smart and active students. When we entered the new school year, there was a new student named Xiu Fang who was the son of a doctor of Chinese and Javanese descent whose father moved from Surabaya to the Mandalika International Hospital.



**Figure 2.** Nyale worm science comic characters

During the science lesson, Mrs. Nur (science teacher) discussed material about the classification of living things. Salma, who is always active in learning in class, answered Mrs. Nur's question about examples of animals belonging to the Phylum Annelida by saying "Nyale Worms". Xiu Fang, who felt very strange hearing the nyale worm, asked Salma about this animal. Seeing Xiu Fang who was curious, Baiq Salma, Wire, and Jagad (Salma's classmate) invited Xiu Fang to follow the tradition of bau nyale (catching nyale). How did they travel while following the scent of Nyale? Did they succeed in uncovering the mystery of Nyale Putri Mandalika? Did they gain new knowledge on Nyale's journey?"

The characters in comics are created differently to show cultural diversity. Even though the Nyale worm festival is a Lombok tradition, this festival can be participated in by various groups or different tribes. Belda-Medina (2024) stated that comics can be used as a medium to promote diversity and inclusion among students. Developing educational comics with local wisdom can foster student morality (Murti et al., 2020).

From the character design and storyline, a comic draft is then created which is part of the realization or construct phase which then becomes prototype 1 of the product. Furthermore, prototype 1 of the product was evaluated and revised by material experts, media experts, and users with the following results. The material expert validation result obtained are presented in Table 2.

**Table 2.** Material Expert Validation

Aspect	Sub Aspect	Percentage (%)
Material aspect	Conformity of material competency standards and basic competencies	81.25
	Concept truth	87.50
	Material Meaningfulness	83.30
	systematic delivery of material	75.00
	Increasing student competency	75.00
Language aspect	Use of good and correct language	87.25
	Correct use of terms	91.67
Presentation aspects	Logical and systematic presentation of material	87.50
	Actively involving students	83.30
	Considering usefulness and meaningfulness	87.50
	Average	83.93

According to BSNP, there are 4 indicators of suitability of content or material, namely suitability of content, suitability of presentation, suitability of language, and suitability of graphics. Table 2 shows that the average validation result is 83.93% with a very feasible category. This means that comics from the material aspect, language aspect, and presentation aspect are very feasible of being used by students. Validation is carried out by experts to ensure that the data is important and eliminate unnecessary data (Taherdoost, 2016). Other research shows that digital comic media has high validity and practicality in its use as open material (Figna et al., 2020). Further Safitri et al. (2023) stated that e-comic media is suitable for use to improve problem solving for high school students because it meets the criteria for high validity, practicality and effectiveness.

The suitability of the material in the Nyale Worm science comic shows that comics as an alternative to science reading can be used as supporting reading for biological material because they match the contents of the comic with the Competency Standards and basic competencies, namely material on the classification of living things, interactions between living things and the environment, and developmental systems in animals. Compatibility of comics with basic competencies can provide content reinforcement for certain materials so that they have an impact on students' understanding of the material. According to Utariyanti et al. (2015), the comic media work system contains complementary learning characteristics. This learning media can be used for classroom learning, used by teachers as a means of conveying information and can also be used by students for studying at home as a learning resource. This is in line with Akcanca (2020), who stated that comics can be used as an alternative teaching tool in science education. Furthermore, Morel et al. (2019) stated that comic books can be used by educators to make learning more enjoyable.

Apart from the material content, the appearance or visuals of the comic are also very important to pay attention to. Science comics combine elements of fantasy or fiction with a scientific context. The media validation results are shown in Table 3.

**Table 3.** Media Expert Validation Results

Aspect	Sub Aspect	Percentage (%)	
Visual display aspects	Cover clarity	91.70	
	Clarity of image media	91.67	
	Format suitability	87.50	
	Balance of lines, space, and writing	100.00	
	Image display	91.67	
	Typography	91.67	
	Aspects of learning design	Relevance of competency standards and basic competencies	91.67
		Providing motivation	83.30
		Creative and innovative media	91.67
		Average	91.20

Table 3 shows that validation from media experts is 91.20% which is included in the very feasible category. This means that comics from the visual appearance aspect and learning design aspect are very suitable for use by students. These results are in accordance with research conducted by other researchers who found that comic media was categorized as very suitable in terms of media aspects (Fatimah & Fatonah, 2023; Rahayuningsih & Setiawan, 2023). The appearance or visualization of comics will influence students'

attraction and attention. Comic visualization includes detailed images which include color and character images, panels including division of image lines which usually consist of several panels per page, and reading balloons which contain dialogue from comic characters. From the research results of Amalia et al. (2018), information was obtained that visual learning media can provide a connection between the content of the material and the real world, besides that visual learning can eliminate learning boredom for students. Pictures are also a form of graphic media, which can attract more attention and reduce boredom compared to text so that children will be more interested in reading books that have lots of pictures (Sari & Yustiana, 2021; Supardi, 2018).

After being tested by material experts and media experts, the Nyale Worm science comic was then tested on users, in this case, students. This aims to find out students' opinions regarding the Nyale worm science comic which includes aspects of the material, language, presentation, appearance, and learning design. User eligibility result is presented in Table 4.

**Table 4.** User Validation Results

Aspect	Percentage (%)
Material	68.96
Language	71.20
Presentation	75.83
Appearance	70.50
Learning design	73.13
Average	71.92

The user's response to the existence of the product is very important because the user's needs are the reason the product was created. The product will have positive value if it meets aspects of the user's needs. Student responses are student responses and reactions given during learning. A response will appear if an object is observed, and the user's response to an object is influenced by the respondent's level of experience regarding the object being observed (Hidayati & Muhammad, 2013).

Table 4 shows that based on user validation, an average score of 71.92% was obtained, which falls into the feasible category. These results align with research conducted by Danaswari et al. (2013), indicating that students' responses to comics were very good in the strong category. This is because comics have a simple form, contain easily understandable explanations, present light material based on everyday life, and include humorous content (Chung & Chung, 2018; Toh et al., 2017). According to Lin et al. (2015), it was noted that comic books increase students' interest and enjoyment in learning, while textbooks decrease their interest and enjoyment. This can certainly encourage

students to enhance their motivation and interest in learning (Affeldt et al., 2018).

## Conclusion

Based on the research results, it can be concluded that the Nyale worm science comic is suitable for use in the learning process to increase student interest. This can be seen from the average percentage obtained based on material and media experts respectively at 83.93% and 91.20% in the feasible category, and 71.92% based on user responses in the appropriate category.

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## Author Contributions

Conceptualization, B. S. H., I. B., L. J., S. B.; methodology, B. S. H., S. B., investigation, I. B., B. S. H., comic storyline, I. M. S., B. S. H., L. J., data curation, S. B., I. B., writing—original draft preparation, B. S. H., and I. B., editing, I. M. S., result and discussion, B. S. H., L. J. All authors have read and agreed to the published version of the manuscript.

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## Conflicts of Interest

The author clarifies that there is no conflict of interest.

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