

Development Of An Ethnoscience-Based Digital Comic "Tari Saman" For Human Movement System Material

Irdalisa¹⁾, Erlia Hanum²⁾, Zulherman³⁾, Elis Nurhayati⁴⁾

^{1,3,4)} Muhammadiyah University Prof. Dr. Hamka, Indonesia

²⁾ Al Muslim University, Indonesia

*Corresponding Author

Email: irdalisa@uhamka.ac.id, erliahanum@umuslim.ac.id, zulherman@uhamka.ac.id, elisnurelis88@gmail.com

Abstract

Scientific literacy skills are still low, and students' lack of interest in getting to know culture is a current educational issue, so innovative, creative and interesting learning media are needed to increase interest in reading and the formation of national cultural character in students. The development of digital comics in the field of science has been carried out by many researchers, but there are still few who combine the material with local wisdom to form cultural characters. This ethnoscience-based digital comic designed to be a pilot project and learning resource for teachers and students in Indonesia in mastering science, technology, skills and attitudes based on the Independent Learning Curriculum. The data was analyzed by processing validator response data with a Likert scale which was converted into qualitative data. The research subjects were media, material and language experts, 60 high school students in class XI high school science, and 6 biology teachers. The instruments used were expert validation tests and questionnaires. The data was analyzed by processing validator response data with a Likert scale which was converted into qualitative data. The purpose of this research can measure the effectiveness of the ethnoscience-based digital comic "Tari Saman" on movement system material to improve students' scientific literacy skills and national cultural character according to P5 (Strengthening Pancasila Student Profile Project). This research uses the 4D method (Define, Design, Develop, Disseminate). The validity test results show that ethnoscience-based digital comics "tari saman" have a moderate level of validity with an Aiken index value > 0.4. the results of the feasibility test were 88% by the teachers and 90% by students and media practicability were 88% by teachers and 89% by students. It can be concluded that ethnoscience-based digital comics "tari saman" are valid, feasible and practical to use as supporting media for Biology learning.

Keywords : Ethnoscience, Digital Comic, Movement System, Tari Saman

INTRODUCTION

Indonesia's Independent Learning Curriculum has given teachers the freedom to use various teaching tools according to the needs and characteristics of students. Applications that provide various references for teachers will also be used so that teachers can develop teaching practices independently. The teaching profession is required to always develop one's professionalism, especially the use of effective models, methods, strategies and learning media (Sims et al., 2021). However, in the field, some teachers' understanding of designing learning media is still categorical whatever it is. The learning media used by teachers on average is still limited (Irdalisa et al, 2022). Teachers still use media such as textbooks and pictures which are included in the simple category (Yin, Wang, Zhao, Lou, & Shen, 2021). This is one of the factors that makes Indonesia's literacy skills less competitive compared to other countries, so that Indonesia is in a literacy culture crisis (Gao et al., 2020). The low level of literacy is proven by data from *The Program For International Student Assessment* (PISA) where Indonesia's literacy ability is ranked 74th out of 79 countries with an average score of 371 (Hewi & Shaleh, 2020).

Apart from the problem of lack of literacy, the nation's cultural character is also a concern for the Government. Indonesian culture is now starting to be forgotten, this is due to the increasing number of foreign cultures entering Indonesia. As a result, people tend to choose new

cultures that are considered more practical than local cultures. One of the factors causing local culture to be forgotten nowadays is; lack of future generations who have an interest in learning and inheriting their culture (Nahak, 2019). A culture-based learning approach can provide opportunities for students to create meaning and achieve an integrated understanding of the scientific information they obtain, as well as the application of this scientific information in the context of the problems of their culture community (Saliman, 2016). So it is necessary to use education as a cultural transformation from one generation to another to develop the nation's cultural character (Pyo, Lee, Bae, Sim, & Kim, 2021).

Solving literacy problems and forming the nation's cultural character, one of which is by developing interesting and innovative teaching media, one of which is digital comics. Digital comics make it easier for students to understand the picture as a whole, express story ideas well coherently and interestingly (Lim et al., 2020). Digital comic media can help teachers convey learning material so that the learning process becomes meaningful (Ranting & Citra Wibawa, 2022). Digital comics have fictional elements such as relationships, manners, emotions and thoughts, place and time, as well as cause and effect relationships expressed with images (Akcanca, 2020). Digital comics are suitable for use in science learning because they contain stories that are appropriate to the learning experience and technological developments so they are practical, flexible and easily accessible to users (Davy Tsz Kit, Luo, Chan, & Chu, 2022). Ide-ide kreatif dapat ditumbuhkan melalui metode pembelajaran maupun dengan bantuan aplikasi baru yang berkaitan dengan kegiatan nyata yang menantang dan berupa pemecahan masalah menyarankan desain yang otentik dan baru, menghasilkan hipotesis yang berbeda (Jayathilaka et al., 2019).

Digital comic development Many researchers have done this, but digital comics developed based on *ethnoscience* are still rarely done, while the Merdeka Curriculum has a *Pancasila Student Profile program* which shapes national character. *Ethnoscience* is an activity that transforms society's original scientific knowledge with science (Risdianto et al. 2021) . *Ethnoscience* -based learning makes it easier for students to understand and apply the science they learn and encounter in everyday life (Nuralita, Reffiane, & Mudzanatun , 2020) .

The culture in Indonesia that can be integrated into Biology lessons is the Tari Saman. Tari Saman was recognized by UNESCO in 2011 (Irmania, Trisiana, & Salsabila, 2021) . Some schools use Tari Saman as an extracurricular activity. Tari Saman is also included in the local content curriculum in schools from elementary schools to high schools and even universities in Indonesia (Rajab Bahry, 2014) . The characteristic of this Tari Saman is dominated by the dance movements which rely on hand, body and head movements, but the most prominent movement of this Tari Saman is the hand movements which are very fast and compact (Souri & Bhattacharyya, 2018). The characteristics of the Tari Saman are considered suitable for application in learning media, especially biology, movement system material in biology lessons. The aim of this research is to develop *ethnoscience -based digital comics* for movement system material in secondary schools and analyze the validity, feasibility and practicality of the product developed (Nozariasbmarz et al., 2020).

RESEARCH METHODS

The method that will be carried out in this research uses *the Research and Development (R&D)* method with a development model 4D (Four-D Models) developed by Thiagarajan (1974). This 4D development model consists of 4 stages, namely *Define, Design, Develop, and Disseminate* (Wang et al., 2021) . The steps are as follows:

Define Stage (Definition)

At this stage, carrying out a needs analysis is by identifying the problems experienced by teachers and students, especially in the learning media used by teachers during the learning process in class.

Design Stage (Designing)

Designing digital comic media, namely by arranging material, formulating story ideas , creating scenarios, and preparing comic formats.

Develop Stage (Development)

This development stage consists of publishing digital comics via the *Flif PDF Professional application*, then validating/feasibility and practicality of digital comic media (Song, Li, Won, Bai, & Rogers, 2020). Next, testing the practicality of what was carried out in this research was to find out whether the digital comic media given to biology teachers and students was practical or not.

Stage (Dissemination)

This stage is the final stage of development, namely disseminating or promoting the product that has been developed. This data analysis technique was obtained from a validation questionnaire given to material experts, language experts and media experts, using Aiken's validity test formula which is based on the results of expert assessments of n people on an item in terms of the extent to which the item represents the construct being measured, namely as follows :

$$V = \frac{\sum S}{[n(c-1)]}$$

Information :

s = r – lo

lol = low validity assessment number (in this case = 1)

r = number given by an appraiser

n = number of validators (raters)

c = highest validity assessment number (in this case = 4)

After obtaining the results of the validated questionnaire scores, the scores are then interpreted based on certain standards using the following benchmarks :

Table 1. Validity criteria for expert tests

No.	Mark	Criteria
1.	0.8 - 1.0	Very Valid
2.	0.61 – 0.80	Valid
3.	0.41 – 0.60	Fairly Valid
4.	0.21 – 0.40	Less Valid
5.	0.00 – 0.20	Invalid

This data analysis technique was obtained from a feasibility questionnaire given to 6 teachers and 60 students, with use formula percentage appropriateness. Criteria interpretation score based on scale Likert, as follows:

Table 2. Eligibility interpretation criteria

Percentage (%)	Category
0 – 20	Very less
21 – 40	Not enough
41 – 60	Enough
61 – 80	Good
81 – 100	Very good

To calculate the percentage , use the following formula:

$$K = \frac{F}{N \times I \times R} \times 100\%$$

Information:

K = Percentage of eligibility

F = Number of response answers

N = Highest score in the questionnaire

I = Number of questions in the questionnaire

R = Number of respondents

This data analysis technique was obtained from a practicality questionnaire given to 6 teachers and 60 students. The measurement scale used in the practicality questionnaire for teachers and students is a positive Linkert scale with 4 answer categories which will be converted into grades with the following value scale :

Table 3. Practicality Category Criteria

Score	Category	Score
1	Very good	4
2	Good	3
3	Enough	2
4	Not enough	1

Furthermore, to find out the practicality of digital comic media, the mean score will be calculated for each response, namely using the following formula (Noorhidayati et al., 2021)

$$V = \frac{TS_e}{TS_h} \times 100\%$$

Information :

V = percentage value

TS_e= total answer score

TS_h= expected maximum total score

As a result of these calculations, researchers will group the assessment criteria based on media practicality criteria as follows:

Table 4. Practicality Percentage Category Criteria

Category	Category
Very Practical	81.00% - 100.00%
Practical	61.00% - 80.00%
Enough	41.00% - 60.00%
Less Practical	21.00% - 40.00%
Impractical	00.00% - 20.00%

RESULT AND DISCUSSION

Ethnoscience- based digital comic "Tari Saman" uses a 4D development model consisting of define, design, develop and disseminate stages. At the define stage, curriculum analysis is carried out and identification of problems in the learning process carried out by teachers, especially learning media. The results of the define stage are used as a basis for product design. At the design stage, researchers design and design digital comic media (Zeng, Wasylczyk, Wiersma, & Priimagi, 2018). The resulting product is then validated by media, material and language experts. The validity of the developed ethnoscience-based digital comic product is measured using an expert agreement index based on the Aiken index (V). The results are presented in Table 1.

Table 5. Aiken Index Coefficient Results for Ethnoscience-Based Digital Comic Media

Assessment Aspects	Aiken Index (V)	Category
Technical quality	0.75	Currently
Display quality	0.86	Very Valid
Ease of use	0.75	Currently
Relevance of the material	0.83	Very Valid
Material accuracy	0.83	Very Valid
Serving equipment	0.75	Currently
Language	0.87	Very Valid
Average	0.80	Currently

In Table 1, it can be seen that ethnoscience-based digital comics have a moderate level of validity with an Aiken index value > 0.4 . Based on validity tests, it shows that the ethnoscience-based digital comics developed are considered valid as learning media. To ensure the feasibility of the product being developed, a development trial was carried out on 60 students and 5 teachers. The assessment of the feasibility of the ethnoscience-based digital comic being developed consists of the aspect of being able to teach students (self instructional), comprehensive and complete (self contained), adaptive, friendly to the user (user friendly) and use of written language (Table 2).

Table 6. Media Appropriate Test Results by Students

Assessment Aspects	Total Score	Eligibility Percentage
Able to teach students (<i>Self Instructional</i>)	870	90.63%
Comprehensive and complete (<i>Self contained</i>)	640	88.89%
Adaptive	875	91.15%
Friendly with the user (<i>User friendly</i>)	420	87.50%
Use of written language	660	91.67%
Average		90%
Conclusion		Very Worth It

Table 2 shows the results of the feasibility test by students of 90% with the very feasible category. The results of the feasibility test for ethnoscience-based digital comics by teachers can be seen in Table 3.

Table 7. Media Appropriate Test Results by Teachers

Assessment Aspects	Total Score	Eligibility Percentage
Able to teach students (<i>Self Instructional</i>)	72	90.00%

Assessment Aspects	Total Score	Eligibility Percentage
Comprehensive and complete (<i>Self contained</i>)	53	88.33%
Adaptive	71	88.75%
Friendly with the user (<i>User friendly</i>)	35	87.50%
Use of written language	52	86.67%
Average		88%
Conclusion		Very Worth It

Table 6 shows the results of the feasibility test by teachers at 88% with the very feasible category. Thus, the ethnosience-based digital comics developed are suitable for use as learning media. After the product developed is declared feasible, it is continued with a practicality test to determine whether the digital comic media developed by researchers is practical or not used as a learning medium (Souri et al., 2020). Practicality assessment aspects include ease of use of media, usability, attractiveness and presentation. The results of the practicality test for ethnosience-based digital comic media developed based on students' views can be seen in Table 3.

Table 8. Practicality Test Results for Students

Assessment Aspects	Total Score	Practicality Percentage
Ease of use of media	1050	87.50%
Utility	1280	88.89%
Attractiveness	430	89.58%
Presentation	660	91.67%
Average		89%
Conclusion		Very Practical

Table 3 shows that the ethnosience-based digital comic media developed is very practical with a percentage of 89%. The practicality test results for teachers had a percentage of 88% (Table 4).

Table 9. Practicality Test Results for Teachers

Assessment Aspects	Total Score	Practicality Percentage
Ease of use of media	72	90.00%
Utility	53	88.33%
Attractiveness	71	88.75%
Presentation	35	87.50%
Average		88%
Conclusion		Very Practical

Thus, the ethnosience-based digital comic media "Tari Saman" that was developed is very practical based on the views of students and teachers as users. Learning media must be able to make the material more concrete and easy for students to understand, in accordance with current developments, especially technology and local culture (Sulistri, Sunarsih, Utama, & Moseki, 2020). Building students' character can be done by collaborating with local wisdom values which are part of community culture (Sari, Pangestika, & Khaq, 2023). The value of character education and local wisdom can be implemented in learning media to support the learning process (Fadillah, 2013). Comics can be used as an alternative medium to convey character messages to students (Ngazizah & Laititia, 2022). In this research, ethnosience-based digital comics were developed. In this case, the researcher designed a digital comic by integrating local community culture in it, namely the Tari Saman. The digital comic developed is based on the ethnosience

of "Tari Saman" which is integrated into the learning of movement system material. The relationship between Tari Saman and movement system material can be seen from the aspect that the Tari Saman movements have distinctive characteristics in the form of hand, body and head movements so they are suitable for inclusion in biology learning, especially movement system material (Shi et al., 2020). The ethnoscience approach uses knowledge that is appropriate to the community's culture and is easily integrated based on community behavior (Munawaroh, Sari, Pambudi, & Ekapti, 2022). Learning will be meaningful if there is integration of local wisdom values to prevent cultural erosion and as an effort to strengthen the character of students (Wahyudi & Agung, 2021). Ethnoscience learning is considered effective because it combines local culture with the material students study at school so that students can easily understand the material (Rahmawati & Atmojo, 2021).

Apart from that, the use of appropriate learning resources and learning media is needed to increase scientific literacy (Sulistri et al., 2020). Students who have scientific literacy will be accustomed to thinking critically and can utilize their knowledge to solve problems in their surrounding environment (Filjinar, Supeno, & Rusdianto, 2022). The ethnoscience-based digital comic "Tari Saman" on movement system material has become an innovation in learning media because it depicts movement system material which is linked to phenomena and culture around students where the learning process is dominated by student activities which lead to literacy achievement. Scientific literacy is related to future competencies that students must have so that their application becomes an important factor in an era of increasingly rapid technology (Fitria, Malik, Mutiaramses, Halili, & Amelia, 2023). Students like comics because they display pictures in each story, making it easier for them to understand the content (Ye, Zhang, Chen, Han, & Jiang, 2020). Depicting learning material in comic form makes it easier for students to understand the picture as a whole, build imagination, express ideas well and tell stories coherently (Gu, Wang, & Lin, 2019). Therefore, the ethnoscience-based digital comic "Tari Saman" is an alternative media to provide a fun learning experience with local cultural content to foster students' scientific literacy and national cultural character (Dong, Sun, Liu, Jiang, & Lu, 2022).

CONCLUSION

The ethnoscience-based digital comic "Tari Saman" that has been developed is declared valid based on the results of expert validation, having a moderate level of validity with an Aiken index value > 0.4 . The results of the feasibility test show that the ethnoscience-based digital comic "Tari Saman" is suitable for use as a learning medium. The results of the feasibility test were 88% by the teachers and 90% by students. The ethnoscience-based digital comic "Tari Saman" that has been developed is declared practical based on assessments carried out by respondents, namely teachers and students. Media practicability were 88% by teachers and 89% by students.

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