JPPIPA 10(1) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of Ethno-STEM-Loaded Digital Science Teaching Materials the Process of Making Traditional Sidoarjo Snacks Material of Force and Object Motion to Train Science Literacy in Elementary School Students

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Received: Sptember 2, 2023
Revised: December 17, 2023
Accepted: January 25, 2024
Published: January 31, 2024

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DOI: 10.29303/jppipa.v10i1.5948

Abstract: This study aims to develop digital science teaching materials with Ethno-STEM content to train elementary students' scientific literacy. The research method used is the ADDIE Research and Development (R&D) model (Analyze, Design, Development, Implementation and Evaluation). The results of the feasibility of digital science teaching materials obtained a percentage of 92.42% with very feasible criteria. The effectiveness of digital science teaching materials was declared effective by the results of the paired t-test which showed that there was an average difference in the pretest and posttest data, and the n-gain results scored 0.40 with the criteria of being effective. The results of the student response questionnaire after the learning process obtained a percentage of 90.35%; as well as the results of the teacher's response questionnaire after the learning process obtained a percentage of 90.62%. The results of student and teacher responses obtained very positive criteria. The conclusions of this study are that digital science teaching materials with Ethno-STEM content are effective in training scientific literacy for grade IV elementary school students.

Keywords: Digital science teaching materials; Elementary school; Ethno-STEM; Force and objects motion; Science literacy

Introduction

Everyone must have various types of literacy, including elementary school students to live life in the current and future society and continue to higher school levels (Fitriani et al., 2019). Literacy is not only the ability to read and write, but there are many other types. Such as the guidebook for the national literacy movement issued by the Ministry of Education and Culture which explains literacy which is divided into six types which include literacy, numeracy, digital, financial, science, as well as culture and citizenship (Ulum & Haerudin, 2022). One of the literacy that should be implemented in science learning in schools is scientific literacy (Kristyowati & Purwanto, 2019). However, in reality there are still many schools that have not implemented scientific literacy. But research by Fitariya (2018) stated that students' scientific literacy was still low. Research by Azmy et al. (2020) concluded that the scientific literacy applied by teachers in learning science in elementary schools is still low. According to Kartini (2019) he teacher is only fixated on material and books, so the learning that is carried out is less meaningful and causes a lack of scientific literacy in students.

Scientific literacy is a person's ability to use scientific knowledge to identify possible questions that arise, acquire new knowledge, describe scientific phenomena and draw conclusions based on scientific evidence (OECD, 2013). Science literacy for elementary students is very important. Because scientific literacy is an understanding of science and how to apply it in solving a problem. Scientific literacy is a person's ability

How to Cite:
Juniawan, E. R., Sumarni, W., & Prasetya, A. T. (2024). Development of Ethno-STEM-Loaded Digital Science Teaching Materials the Process of Making Traditional Sidoarjo Snacks Material of Force and Object Motion to Train Science Literacy in Elementary School Students . *Jurnal Penelitian Pendidikan IPA*, *10*(1), 325–337. https://doi.org/10.29303/jppipa.v10i1.5948

to apply scientific knowledge that can be used in everyday life (Pradini et al., 2022). There is a learning model that can increase scientific literacy, namely STEM learning (Permanasari, 2016). STEM is learning that is based on four components, namely science which consists of science, technology, engineering, and mathematics (Risnawati, 2020). The STEM field includes Ethno-STEM which is a learning model with local wisdom content that will develop into scientific knowledge, namely knowledge in science, technology, simple engineering techniques, and mathematical calculations (Reffiane et al., 2021). The use of Ethno-STEM in learning is also expected to elevate local wisdom in Sidoarjo to integrate culture in learning. Local wisdom is a product of the experience of a certain group (Wiratmaja et al., 2021). According to Rumilah et al. (2021) local wisdom is one way to manage culture and protect oneself from unwanted foreign cultures.

Local wisdom that has been included in the list of culinary tours in Sidoarjo is klepon bulang, Sidoarjo mud cakes, and Porong ote-ote (Abadi et al., 2013). Klepon is a typical market snack that includes wet cakes which have a round shape, the size of a marble, green in color from suji leaves, made from glutinous rice flour filled with liquid brown sugar, and served with a sprinkling of grated coconut (Setyorini & Qomariah, 2018). Sidoarjo mud cake is a non-perishable wet cake that has a soft texture, and the basic ingredients are easily available in the market, namely milk, sugar, eggs and flour (Dewanto, 2022). Ote-ote Porong is a typical Sidoarjo food which was introduced by a Chinese citizen named Kwee Le Kin who came from Fuzhou city and settled in Porong sub-district, Sidoarjo Regency (Fitria, 2022). Porong ote-ote is different from the others, because this ote-ote contains meat, oyster and seaweed filling (Muallifa, 2020).

In addition, the researcher conducted unstructured interviews with several teachers and grade IV students at Elementary School in several different sub-districts in Sidoarjo, namely Kenongo 1 Elementary School, Sumokembangsri 1 Elementary School, and Bulang Elementary School who concluded that the science lessons taught by these teachers used discovery learning with discussion methods and questions and answers. This learning has also been linked to everyday life by taking contextual examples. From the results of the unstructured interviews, information was also obtained that the learning resources that had been used by the teacher were from the teacher himself, the textbooks and LKS books that had been prepared by the government, as well as the surrounding environment. Only one school uses the internet for learning. In addition, the results of the analysis of books used by teachers and students pay little attention to Ethno-STEM. Thus, these teachers had never developed teaching materials used for the science learning process in their class. The media used by the teacher are objects at school and at home. Only one school uses PowerPoint, images, and videos. So that the learning process carried out has not been integrated with local wisdom around. Because local wisdom also includes the structure of the independent learning curriculum in elementary schools which can be included in subjects that can be added flexibly by each school (Hartoyo & Rahmadayanti, 2022).

Referring to the results of interviews with teachers and students as well as observations at school, it was found that the need for learning resources in the form of teaching materials is very much needed to make it easier for teachers to teach and make it easier for students to learn. This was conveyed directly by the teachers and the questions the researchers had asked the students. Teaching materials are teaching tools that contain material that is methodically arranged and in accordance with the abilities to be achieved (Nurhamdiah et al., 2020). Teaching materials are divided into two, namely printed teaching materials including handouts, modules, books, and LKS and non-printed teaching materials including audio, audio visual, and interactive multimedia (Kelana & Pratama, 2019). Another example of non-printed teaching materials is digital teaching materials in which virtual technology is produced (Purwanto & Risdianto, 2022). According to Rahmawati et al. (2022) digital teaching materials are a new innovation in the world of education that integrates technology, information and communication in the learning process to present learning materials packaged in unique and practical teaching materials. Utilizing various media and information technology devices in presenting teaching materials in more varied and interesting forms so that students more easily understand the subject matter (Nugraha et al., 2023).

The material in digital teaching materials is integrated with local wisdom, namely the process of making klepon in Sidoarjo, because along the Prambon main road, Bulang village, Sidoarjo Regency there are many home industries that make klepon. Where the Klepon Bulang businesses are very close to the student environment at Bulang Elementary School. Sidoarjo mud cake was chosen because at every formal and non-formal event, Sidoarjo mud cake is often served. Because this is a traditional snack that is also often found by students in Sidoarjo. In addition, around Kenongo 1 Elementary School there are many mud cake sellers. One of the famous mud cakes is the roasted mud cake which is located on the Kenongo highway, Kenongo village, Sidoarjo Regency. In addition, Porong ote-ote was chosen by researchers because Porong ote-ote is very

legendary in the Sidoarjo area. In addition, until now many buyers come from outside Sidoarjo district.

The results of observations on home industries that make klepon in the area of Bulang, kue lumpur Sidoarjo, and Porong ote-ote found the concepts of natural science (science), technology, engineering results, and mathematics. In observing the process of making traditional Sidoarjo snacks, it can be seen that there is a concept of force and movement of objects that occur in the process of making traditional snacks which can change the ingredients used into traditional Sidoarjo snacks, where the concepts of style and motion can be used in the process of learning science in class. IV, namely the material force and motion of objects. Thus, teachers and students need learning resources in the form of digital teaching materials with Ethno-STEM content which are associated with the process of making traditional Sidoarjo snacks in which there is material for style and motion of objects used to train scientific literacy in class IV elementary school students.

Research by Saputra et al. (2022) with title "Pengembangan Bahan Ajar Tematik SD Kelas IV Berorientasi Etno-STEM" or in english "Development of Ethno-STEM Oriented Elementary Class IV Thematic Teaching Materials" which uses the technique of sago, sandalwood and cassava as material in the learning process for fourth grade elementary school students. Research by Saputra et al. (2022) has several kinds of culture raised in the Papua area. Research by Khoiriyah et al. (2021) with title "Efektivitas Pendekatan Etnosains dalam Pembelajaran Daring untuk Meningkatkan Motivasi dan Hasil Belajar Siswa pada Materi Kalor" or in english "Effectiveness of the Ethnoscience Approach in Online Learning to Increase Student Motivation and Learning Outcomes in Caloric Materials" which uses klepon as material in the learning process carried out in junior high school students. Research by Elisa et al. (2022) with title "Analisis Konsep-Konsep Fisika Berbasis Kearifan Lokal pada Pembuatan Jajanan Tradisional Dawet dan Klepon" or in english "Analysis of Physical Concepts Based on Local Wisdom in the Making of Dawet and Klepon Traditional Snacks" which uses klepon as physics material in the learning process carried out by junior and senior high school students. Research by Mulyatna et al. (2022) with title "Eksplorasi Kembali Etnomatematika Pada Jajanan Pasar Di Daerah Cileungsi" or in english "Re-Exploration of Ethnomatematics in Market Snacks in the Cileungsi Area" which uses klepon as mathematical material in the learning process carried out on elementary students.

So it can be concluded that no one has researched the process of making traditional snacks in the form of klepon, kue lumpur, and ote-ote which are used for digital science teaching materials containing Ethno-STEM traditional snacks. So, this research must be carried out. The novelty of this researcher is by using the process of making traditional snacks in the form of klepon, kue lumpur, and ote-ote as a support for the science learning process in elementary school which is packaged in digital science teaching materials containing Ethno-STEM traditional Sidoarjo snacks to train scientific literacy in elementary school students. So that this research is expected to be a new reference for teachers and other researchers. So the problems studied are: 1) What is the feasibility of digital science teaching materials with Ethno-STEM content, the process of making traditional Sidoarjo snacks, the material for style and motion of objects based on expert judgment and user responses to train scientific literacy in elementary school students?; 2) What is the effectiveness of digital science teaching materials with Ethno-STEM content in the process of making traditional Sidoarjo snacks, material for style and motion of objects to train scientific literacy in fourth grade elementary school students?; 3) What is the response of students and teachers after using digital science teaching materials containing Ethno-STEM traditional snacks from Sidoarjo in class IV Elementary School?

Method

The research method used is the ADDIE Research and Development (R&D) model (Analyze, Design, Development, Implementation and Evaluation). In the development of digital teaching materials, the first stage is analysis. The analysis phase is the stage used to identify problems that arise and the need for the product to be developed. At this stage it is used to find out the existing problems and needs. Thus a needs analysis is carried out in developing the product as a solution to the problems found from the results of observations and interviews. Observations were made in learning activities to find science teaching materials in elementary schools. Furthermore, to support product development, an analysis is carried out on the curriculum used, as well as the scope of the material. Then to find out the needs of students and teachers in the teaching materials to be developed, interviews were conducted with students and teachers. Apart from that, during the material analysis process, the researcher explored and reconstructed the process of making traditional Sidoarjo snacks to find natural science material with Ethno-STEM content. Then the researcher also explored the results of previous research on elementary school teaching materials that had been previously developed to be used as a reference in developing elementary school teaching materials.

The second stage is the design stage. At this stage the design of digital science teaching materials is carried out as a product to be developed. The resulting design is based on the needs analysis at the analysis stage. The teaching materials developed are in the form of digital teaching materials that can be used on smartphones and laptops in which there is style and motion material integrated with Ethno-STEM in the form of traditional Sidoarjo snacks in the form of Bulang klepon, Sidoarjo mud cakes, and Porong ote-ote which are used to train scientific literacy fourth grade elementary school students. This design is in the form of a draft which is then realized into digital teaching materials that are ready to be developed. This stage will obtain the characteristics of the digital science teaching materials that will be developed.

The third stage is the development stage. This stage contains the steps used to develop products in the form of digital science teaching materials. This stage consists of several steps. The first step is validation by a team of experts. The validation step consists of material validation, media validation, and test instrument validation. If the product validation process requires revision, then the product must be revised until the product being developed can be categorized as valid. Then digital science teaching materials were tested on small-scale trials. Small-scale trials are used to determine the legibility, practicality and applicability of the product being developed. Then revisions were made in order to get digital science teaching materials that were feasible to use. The small-scale trial involved 10 students and 1 fourth grade elementary school teacher.

The fourth stage is the implementation stage. At this stage, a large-scale trial was carried out to determine the effectiveness of the product developed using the t-test and n-gain. The design used was a pre-experimental design with a one-group pretest-posttest design model, in which pretest questions were given before being given treatment and then posttest questions were given after the study. So the data needed is the data from the students' pretest and posttest results. The aim is to find out the results of the treatment in order to be able to compare the conditions before and after being given treatment. Then students were given a student response questionnaire to find out student responses after using digital science teaching materials. In addition, the teacher was also given a teacher response questionnaire to find out the teacher's response after using digital science teaching materials. The large-scale trial involved 33 students and 2 fourth grade elementary school teachers.

The fifth stage is the evaluation stage. After getting the research data at the implementation stage. The data is then analyzed according to a predetermined formula to find out the results of the development of teaching materials. In addition, this evaluation also aims to determine the strengths and weaknesses of the teaching materials that have been developed. The developed product is then disseminated for use or followed up for further development. In addition, the results of the analysis obtained are then published in journal articles.

There are several data analysis techniques in research on the development of digital science teaching materials, namely validity, readability, practicality, applicability and effectiveness of digital science teaching materials. Validation data is obtained from a questionnaire that has been filled in by the validator. Data analysis was used to determine the validity of the digital science teaching materials being developed and the test questions to be used to measure students' scientific literacy. Analysis can be done using a Likert scale. The results of material and media validation can be seen from a comparison of the scores obtained with the maximum score from the questionnaire, as follows:

$$\text{V-ah} = \frac{TSe}{\text{TSh}}\ x\ 100\% \quad (1)$$

(Source: Akbar, 2013)

Information:
V-ah = Expert Validation
Tse = Total score obtained
Tsh = Maximum total score

The results of the percentage validation of the material and media obtained are then used to determine the validity of the teaching materials developed with the criteria in Table 1.

Table 1. Criteria for the Validity of Materials, Media, and Test Questions (Akbar, 2013)

Percentage	Criteria	Description
0-20	Strongly invalid	Should not be used
21-40	Invalid	Should not be used
41-60	Invalid	Needs major revision
61-80	Valid	Needs minor revision
81-100	Very valid	No revision needed

Data on legibility, practicality, applicability, as well as student responses and teacher responses were obtained from questionnaire answers given to teachers and students which would then calculate each answer. The data obtained by the researcher from the questionnaire were processed using the following formula:

For data analysis from individual (teacher) anget results, the formula below is used:

$$\text{V-pg} = \frac{TSe}{\text{TSh}}\ x\ 100\% \quad (2)$$

(Source: Akbar, 2013)

Information:
V-pg = User validation (Teacher)
Tse = Total score obtained
Tsh = Maximum total score

Meanwhile, for data analysis from the results of the student questionnaire, the formula below is used:

$$\text{V-au} = \frac{TSe}{\text{TSh}}\ x\ 100\% \quad (3)$$

(Source: Akbar, 2013)

Information:
V-au = Audience validation (students)
Tse = Total score obtained
Tsh = Maximum total score

The results of the practicality test percentage obtained are then used to determine the practicality of the teaching materials developed with the criteria in Table 2.

Table 2. Criteria for Practicality of Digital Science Teaching Materials (Akbar, 2013)

Percentage	Criteria	Description
0 - 20	Very impractical	Can not be used
21 – 40	Impractical	Can not be used
41 – 60	Quite practical	It is recommended not to use
61 – 80	Practical	Usable with minor revisions
81 - 100	Very practical	Can be used without revision

The data on the eligibility results of teaching materials were obtained from the results of the questionnaire from media experts, material experts, student readability, student practicality, teacher practicality, and student implementation which would then be calculated as an average. The data obtained by the researcher is processed using the following formula:

For data analysis from the feasibility results of teaching materials, the formula below is used:

$$\bar{x} = \frac{\sum x}{\text{n}} \quad (4)$$

(Source: Arikunto, 2008)

Information:
$\bar{x}$ = Average score
$\sum x$ = Total scoring score
n = Number of assessment aspects

The results of the feasibility test percentage obtained are then used as a reference to determine the feasibility of teaching materials developed with the criteria in Table 3.

Table 3. Eligibility Criteria for Digital Science Teaching Materials (Arikunto, 2008)

Percentage	Criteria
0-20	Totally not worth it
21-40	Not feasible
41-60	Feasible enough
61-80	Feasible
81-100	Very feasible

Analysis of test results data was used to determine the effectiveness and increase in students' scientific literacy skills after using the digital science teaching materials that were developed. The test results use a scale of 1-100. To compare the average pretest results and the average posttest results using a paired sample t-test with the help of SPSS software. The Paired Sample t-test has the following conditions: 1) The subject's data is interval or ratio data; 2) Both groups of paired data are normally distributed. So that before carrying out the paired sample t-test, a Normality Test was carried out. The normality test was carried out using the Shapiro-Wilk test method via SPSS.

The proposed hypothesis:
Null hypothesis (H0): Data is normally distributed
Alternative Hypothesis (Ha): Data is not normally distributed

The decision making criteria is, if sig. (p value) ≤ 0.05 (5%) then Ha is accepted or H0 fails to be accepted, meaning that the data is not normally distributed. Conversely, if sig. (p value) > 0.05 (5%) then H0 is accepted or Ha fails to be accepted, meaning that the data is normally distributed. Then do the homogeneity test. The homogeneity test was carried out to find out whether the subjects taken were from homogeneous variants or not. The homogeneity test of the research data was tested through the SPSS 23 application with the following criteria that if the significance is <0.05, the group variance is different, and If significance > 0.05 then the group variances are the same.

After the data is said to be normal and homogeneous, a paired sample t-test is performed. If the value of Sig. (2-tailed) < 0.05, then H0 is rejected and Ha is accepted. Conversely, if the value of Sig. (2-tailed) > 0.05, then H0 is accepted and Ha is rejected. The hypothesis tested is as follows:
H0 = There is no mean difference between pretest and posttest.
Ha = There is an average difference between pretest and posttest.

The N-gain test is used to measure the increase in student test results. The n-gain test can be carried out when there is a significant difference between the pretest and posttest results. The n-gain test formula is:

$$< g >= \frac{Posttest - Pretest}{Maximum\ Score - Pretest} \quad (5)$$

(Source: Riduwan, 2012)

The calculated results are then interpreted based on the n-gain criteria table which can be seen in Table 4.

Table 4. Criteria for N-gain (Sundayana, 2016)

N-Gain Score	Criteria
-1.00 – 0.0	There was a decline
0.00	No increase
0.00 – 0.30	Low
0.31 – 0.70	Currently
0.71 – 1.00	Tall

Result and Discussion

After the realization of digital science teaching materials with Ethno-STEM content, a feasibility test was carried out for digital science teaching materials containing Ethno-STEM in the process of making traditional Sidoarjo snacks based on force and motion of objects. The feasibility test is seen based on expert judgment and user responses. The results of the material validation carried out by the material expert validator obtained a result of 95.58%; language validation results 92.7%; and the validation results of teaching materials get 95% results with very valid criteria. However, to perfect the material in digital science teaching materials, the validators provided several suggestions and improvements. After that, the researcher revised the digital science teaching materials according to the suggestions and improvements made by the validator.

The results of the readability test by students obtained a percentage of 88.75% with very good criteria. The results of the practicality test by students obtained a percentage of 88% with very practical criteria. The results of the practicality test by the teacher obtained a percentage of 100% with very practical criteria and the results of the implementation test by students obtained a percentage of 86.94% with very good criteria. Then an average is carried out to determine the feasibility of digital science teaching materials. The average result is that the feasibility percentage is 92.42% with very decent criteria with some suggestions and improvements from experts and users.

The material in digital science teaching materials is also adjusted to the learning outcomes and learning objectives in the independent curriculum. The material must also be adapted to the needs of students. The content of the material in teaching materials is adjusted to the needs of students and related to their age development (Darwanto & Meilasari, 2022; Desyandri et al., 2021). The material developed by the researcher is presented in an interesting way to help students understand each material and arouse students' interest in reading the teaching materials that have been developed (Alim et al., 2023; Novianti & Ambarwati, 2023; Virijai & Asrizal, 2023; Wanabuliandari & Ardianti, 2023; Wiandita et al., 2023). The contents of teaching materials are arranged in a complete and systematic manner, from the cover section, preface, table of contents, learning objectives, chapter titles, content, practice questions, and bibliography (Damayanti & Sukmawarti, 2022; Hikmah et al., 2022; Lubis et al., 2022). The language used in teaching materials is a language that has been adapted to the EYD and KBBI so that it is easily understood by students (Saddhono et al., 2023).

The teaching materials developed are adapted to the needs of teachers and students as well as local wisdom around them (Hadi et al., 2015; Kamidah et al., 2023). In addition, digital science teaching materials are very important to be accompanied by animated images and videos. In digital science teaching materials there are also interesting animated images. Because animated images can make students focus and enthusiastic in participating in learning (Akmalia et al., 2021). In addition to animated images, this digital science teaching material also contains two kinds of videos, namely the process of making traditional Sidoarjo snacks and video material on styles and motion of objects to increase students' understanding of material styles and motion of objects. Because videos can also make students understand more about the material (Anjarwati et al., 2023; Fitriyani & Solihati, 2022). Digital media really attracts students' attention (Hariyadi et al., 2023; Sholihah et al., 2023). The design used is adjusted to the characteristics of students, attractive, proportional, selection of fonts, images, and layout (Pradana & Uthman, 2023).

The normality test was carried out using the Shapiro-Wilk technique. The results of the normality test are based on the results of the pretest and posttest. if sig. (p value) ≤ 0.05 (5%) then Ha is accepted or H0 fails to be accepted meaning that the data is not normally distributed. Conversely, if sig. (p value) > 0.05 (5%) then H0 is accepted or Ha fails to be accepted, meaning that the data is normally distributed. The proposed hypothesis: Null hypothesis (H0): Data is normally distributed. Alternative Hypothesis (Ha): Data is not normally distributed.

Based on the results of the normality test, it is known that the pretest scores obtained Sig. 0.676 > 0.05 then the data is normally distributed. Meanwhile, the posttest scores obtained Sig. 0.085 > 0.05 then the data is normally distributed. From the data analysis, it was found that the pretest and posttest data were normally distributed. Then do the homogeneity test. The

homogeneity test was carried out with the aim of knowing whether the subjects taken came from homogeneous variants or not. The homogeneity test of the research data was tested through the SPSS 23 application with the following criteria If the significance is <0.05, the group variance is different, and if significance > 0.05 then the group variances are the same.

Based on the results of the homogeneity test, it is known that the pretest scores obtained Sig. 0.093 > 0.05 then the group variances are the same. While the posttest scores obtained Sig. 0.552 > 0.05 then the group variances are the same. From the data analysis, it was found that the pretest and posttest data were the same group.

After the data is said to be normal and homogeneous, a paired sample t-test is performed. If the value of Sig. (2-tailed) < 0.05, then H0 is rejected and Ha is accepted. Conversely, if the value of Sig. (2-tailed) > 0.05, then H0 is accepted and Ha is rejected. The hypothesis tested is as follows:

H0 = There is no mean difference between pretest and posttest

Ha = There is an average difference between pretest and posttest.

The results of the paired t-test show that the value of Sig (2-tailed) 0.000 <0.05 means that Ho is rejected and Ha is accepted. This shows that there is an average difference in the pretest and posttest data.

The n-gain test can be carried out when there is a significant difference between the pretest and posttest results. Based on the results of the n-gain calculation, a score of 0.40 is effective. Then it was analyzed and it was found that the increase in student learning outcomes between before and after the use of digital science teaching materials was in the moderate criteria.

The effectiveness of digital science teaching materials with Ethno-STEM content which was developed to train scientific literacy in grade IV elementary school students is known based on the analysis of test results before and after the use of digital science teaching materials in large-scale trials. The test instrument is prepared based on indicators of scientific literacy which include content knowledge, procedural knowledge, and epistemic knowledge (OECD, 2019). The test instrument also includes testing students' knowledge of the local wisdom of Sidoarjo Regency, especially traditional snacks in the form of klepon monthang, kue lumpur, and porong ote-ote.

The pretest average score was 33.03, with a minimum score of 14 and a maximum of 54. Based on the test instrument grid (attachment) and the scoring guide (attachment), students did not know about local wisdom, especially other than the klepon gunung. In addition, students also do not understand the questions, and describe the answers correctly. Some students also lack content knowledge, procedural knowledge, and epistemic knowledge in science learning. So it can be seen that the scientific literacy of grade IV students at Bulang Elementary School is still lacking. So that the most important role in the classroom is the teacher who can create learning that involves students, and provides learning instruments in the form of learning resources that contain indicators of scientific literacy so that the learning atmosphere is fun, and attracts enthusiasm and interest in student learning (Amini & Sinaga, 2021; Fortuna & Fitria, 2021; Efendi et al., 2021; Yuliati, 2017; Situmorang, 2016). Teachers are also expected to be actors who are able to utilize technology in learning (Nuraini et al., 2023; Putri & Ramli, 2023; Kasi et al., 2022).

In addition to using digital science teaching materials containing Ethno-STEM, students are also invited to practice gravity. This practicum was carried out on the second day, the class was divided into small groups consisting of 6 to 7 students. This is done so that students better understand the practicum carried out. After the practicum was finished, representatives of each group presented the results of the practicum that had been written on their group's worksheet.

After learning using digital science teaching materials that have been developed, the posttest average score is 60.27 with a minimum score of 42 and a maximum score of 80. Based on the test instrument grid (appendix), and scoring guidelines (appendix), students have known about local wisdom, especially related to traditional Sidoarjo snacks. The material presented is local wisdom material that is in the environment around students so that they continue to preserve local local wisdom (Hastuti et al., 2020; Lyesmaya et al., 2020; Widyasari et al., 2023). Students become active in the learning process by applying science learning based on local wisdom (Usmeldi & Amini, 2020; Wahyu et al., 2023). In addition, some students have also been able to understand the questions, and describe the answers correctly. Students are able to understand content knowledge, procedural knowledge, and epistemic knowledge in science learning, according to indicators of scientific literacy. This is in line with the understanding of constructivists that one's knowledge is built through experiences in their environment (Yustinaningrum et al., 2018). This is because some of the parents of grade IV students at Bulang Elementary School are makers of the traditional Klepon Bulang snack.

After obtaining the data, a paired t-test was then carried out which had previously been carried out the normality test and homogeneity test as a condition

before the paired t-test was carried out to determine whether there was a difference in the average results of the students' pretest and posttest. The results of the normality test show that the data are normally distributed and the group variance is the same. So that it can be done paired t-test. Based on the results of the ordered t-test, it was found that there were differences between the results of the students' pretest and posttest. In addition to the t-test, an n-gain test was also carried out to find out the criteria for increasing student learning outcomes. From the n-gain results, a score of 0.40 was obtained which stated that the increase in student learning outcomes was in the medium criteria. Thus digital science teaching materials are effective for training students' scientific literacy. According to Martalia et al. (2022), Muflikatun et al. (2021), Febrianti (2021), Wiandita et al. (2023) which states that digital teaching materials can make students more enthusiastic about participating in the learning process so that they can increase students' scientific literacy. There are some students who do not have scientific literacy in medium or high criteria. So it is necessary to make efforts to increase scientific literacy, namely by finding out internal factors from students and external factors in order to find out student constraints during learning takes place (Mayasari & Usmeldi, 2023; Novita et al., 2021; Wahyu et al., 2023). In addition, there are criteria used to evaluate cognitive aspects based on scientific literacy Situmorang (2016), including: 1) The questions presented are broad; 2) The questions are presented in the form of data and contain information; 3) There is a concept linkage; 4) When answering questions, you are required to analyze the problem and provide a statement in the form of reasons; 5) There are variations in the presentation of the questions; 6) Packaged in an application related to issues of science, technology, environment, and society.

The digital science teaching materials that have been developed contain Ethno-STEM content. Ethno-STEM is learning in which there is a culture that is combined with science, technology, engineering, and mathematics so that children can carry out scientific steps and have scientific literacy (Idrus & Suma, 2022; Atmojo, 2021; Risnawati, 2020). Ethno-STEM is effective for encouraging students to learn to maintain the surrounding culture which is applied in the learning process in the classroom (Ansumarwaty et al., 2023; Rizki et al., 2022; Sumarni et al., 2022; Saputra et al., 2022). The cultural aspect included in this digital science teaching material with Ethno-STEM content is the process of making traditional snacks. Traditional snacks can be included in the learning process in order to find the concept of learning material on traditional snacks and introduce and preserve some traditional snacks (Febrianti & Indrawati, 2021; Hasanah et al., 2021; Christopher et al., 2019; Priyatnomo et al., 2016).

Conclusion

Based on the results of the research on the development of digital science teaching materials with Ethno-STEM content to improve scientific literacy training in fourth grade elementary school students, it was concluded that digital science teaching materials get a feasibility level of 92.42% very feasible criteria, digital science teaching materials with Ethno-STEM content are effective in training scientific literacy of grade IV elementary school students from the results of the paired t-test which showed that there was an average difference in the pretest and posttest data, and the n-gain results scored 0.40 with effective criteria. This digital science teaching material can be used and developed for learning science in grade IV elementary schools. The results of the student response questionnaire after using digital science teaching materials obtained a percentage of 90.35%; as well as the results of the teacher's response questionnaire after the use of digital science teaching materials obtained a percentage of 90.62%. The results of student and teacher responses obtained very positive criteria. As for suggestions addressed to educators and further researchers, namely on the use or development of teaching materials, it is better to pay attention to learning needs, characteristics, student learning environment, and the times so that their implementation can be effective and efficient. In science learning, it should pay attention to content knowledge, procedural knowledge, and epistemic knowledge which will have an impact on students' scientific literacy. The local wisdom of each region can be used as the development of teaching materials to apply the important values that students need.

Acknowledgments
Thank you to everyone involved in this research.

Author Contributions
ER Juniawan contributed to conceptualizing research ideas, developing products, analyzing data, and writing research results. W Sumarni and AT Prasetya were supervisors in research activities up to writing research results.

Funding
This research was independently funded by researchers.

Conflict of Interest
The author declare no conflict of interest.

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