DEVELOPMENT OF ETHNOSCIENCE-BASED INTEGRATED SCIENCE E-MODULES USING FLIPBOOKS ON THE THEME OF REBON SHRIMP PASTE

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Abstract

Integrated science learning in ethnoscience is very important because students can know the concrete form of local culture by constructing indigenous knowledge of the community in the process of making shrimp paste into scientific knowledge which is implemented through learning media in the form of e-modules. The purpose of this study was to produce an e-module and determine the level of validity, and student readability to an integrated science-based e-module based on ethnoscience using a flipbook with the theme of rebon shrimp paste. This type of research is development research using the ADDIE development model. The population in this study were all students of class VIII MTsN 2 Sumenep with a sample of class VIII-B. Sampling using purposive sampling technique. The instruments used were validation sheets of media experts, material experts, science teachers, and questionnaires student readability. The results showed that: 1) The results of the media aspect validity were 88.74% and the reliability value was 95.71% with very valid and very reliable categories. The value of the validity of the material aspect is 86.11% and the reliability value is 89.66% with a very valid and very reliable category. 2) Students' readability scores a percentage value of 88.18% with a very good category.

Keywords: E-module, Ethnoscience, Flipbook, Science Learning

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INTRODUCTION

The 2013 curriculum can facilitate students to learn about cultures that are close to the students' environment (Haspen et al., 2021). Learning that is in accordance with the rules in the education curriculum is the application of ethnoscience which has the aim of fostering an attitude of love for culture and nation and making students experience an increase in understanding the potentials found in the surrounding area (Nuralita, 2020). Education in schools should be a place that plays a role in instilling students in preserving existing cultures in Indonesia (Pingge, 2017). A student environment where ethnoscience is present will make it easier for students to understand learning (Haspen et al., 2021). 2013 dapat memfasilitasi siswa untuk mempelajari kebudayaan yang dekat dengan lingkungan siswa (Haspen et al., 2021).

Natural Science Education is a process to foster awareness of the values contained in society in the development of good or positive science application attitudes and behavior (Pamungkas et al., 2017). Science is a science in the form of symptoms that occur in nature and then presented in the form of facts, concepts, and principles and laws that have been tested with the scientific method (Nurhairani, 2018). In science learning, students are expected to have the ability to think, learn, have a scientific attitude and be oriented towards contextual problems that students face so that they can develop so that they have applicative properties (Izma et al., 2019). Based on the development of the 2013 curriculum in science education, it prioritizes or pays attention to ethnoscience on national identity and character as well as the local cultural customs of the Indonesian people (Hadi et al., 2019).

This is different from the fact that education in schools is not in accordance with the objectives of education that have been determined. One of the reasons is because the learning process applied by the teacher has almost no connection between the concepts in science material and culture or local wisdom in everyday life, especially those found in the environment around the school (Sari et al., 2018). The integration of local wisdom that develops in society into a learning process, especially in the field of science, is almost never associated (Safitri et al., 2018).

The solution in dealing with these problems requires the introduction of local wisdom to the next generation, especially students, and this is very relevant to be applied. The application of the process of introducing local wisdom in the formal education level can be the right media because formal education itself is a forum for socializing good values (Syaputra, 2019). This is one of the teacher's efforts in providing opportunities for students to apply the concepts of material learned in class with real-life phenomena, so that students in learning become more meaningful and understand well (Mantaka et al., 2017). Ethnoscience in science learning is defined as an activity in transforming indigenous science in society (indigenous knowledge of the community) with scientific science (Sarini & Selamet, 2019). Ethnoscience-based learning in schools by integrating local culture in the local area in the learning process can instill citizenship and cultural literacy. The process of integrating ethnoscience in learning, there is a culture in it that is related to the concepts of science material, so that it can be used as a learning medium that can be used for teachers and students in constructing observations produced by teachers or students into a creative principle (Atmojo & Lukitoaji, 2020). Learning in schools in integrating ethnoscience is very important to do, one of which is by developing media or teaching materials.

The fact of the problem also occurs because the media used in the science learning process is less varied and in visualizing abstract material is still low. The reason is because the media used is limited and the facilities are inadequate (Deliany et al., 2019). The media used to support students' needs in the learning process is still low (Zahro et al., 2019). Teachers in the learning process should not only use one learning resource, because it can have an impact on achieving less than optimal learning outcomes (Untari, 2017). The use of digital learning functions in dealing with situations and conditions in the learning process between teachers and students, because conventional learning with the current situation is no longer suitable (Sa'diyah, 2021).

E-modules are teaching materials whose form of preparation is carried out systematically, the presentation is electronic, and the content of learning activities is connected by a link so that students become more interactive because it contains videos, animations that make students' experiences and insights in learning deeper (Dwiyanti et al., 2021). The use of e-modules in learning has several advantages, namely that they can attract students' attention because they are equipped with pictures and videos. E-modules are made using applications, one of which is the Flipbook application. Presentation on e-modules in electronic form can make the student learning process more interesting because of the display in it (Susanti & Sholihah, 2021). Flip Pdf Corporate is a software that can be used to create interactive media easily because the application can create a medium that can be equipped with images, video, audio, animation, and hyperlinks. So that the

books and media developed become better and easier to read (Putri & Slamet, 2021).

Based on research conducted by Mustikasari, et. al (2017), it is suggested that the material on the concept of solid pressure, Archimedes' law, and osmosis occurs misconceptions in students (Mustikasari et al., 2017). Biotechnology is one of the branches of biological material, with the teaching materials used in it still theoretical and there are still no teaching materials available that integrate local potential that develops in the community. The impact is that students' understanding is only theoretical but less applicable to the local potential around them (Nurhidayati & Khaeruman, 2017). Additive learning textbooks in visualizing concepts associated with real natural symptoms in everyday life are still limited, the book refers more to text and limited images (Himmah & Martini, 2017). The making of shrimp paste in pounding shrimp using mortar and pestle has the science concept of solid pressure. The concept of biotechnology in the process of making shrimp paste is in the fermentation step by requiring the role of microbes in the form of lactic acid bacteria. The concept of additives in making shrimp paste is during the process of applying salt to shrimp which is used to improve the flavor and natural preservatives of shrimp paste.

Terasi is a food industry product whose main ingredient is made from small shrimp or rebon shrimp (Rikah & Widodo, 2019). Terasi products are one of the fishery products whose processing is done traditionally, namely through fermentation. The texture of terasi has a solid shape, a little rough, a distinctive aroma and a very savory taste (Hermawati et al., 2021). Fermentation in the process occurs to convert complex organic compounds such as proteins, fats, and carbohydrates into simpler forms in unaerobic conditions (Rinto, 2018). One of the areas known to produce food that utilizes marine products such as shrimp paste is Ambunten Sumenep District. The process of making shrimp paste in the Ambunten area still uses the traditional way by using mashing tools instead of grinding. The making of rebon shrimp paste in Ambunten area has a characteristic that before fermentation the shrimp that has been pounded is wrapped using teak leaves. The rebon shrimp is pounded using a wooden pestle and gives additional salt to the rebon shrimp.

Sumenep district is one of the districts in East Java located at the eastern end of Madura Island. The number of shrimp paste industries in East Ambunten village is around 13 small industries. The existence of the shrimp paste small industry is able to provide additional opportunities for labor and additional income. The community around the production house is the labor force working in the small shrimp paste industry. The community in East Ambunten village predominantly earns a living as fishermen and has sufficient natural potential to carry out the shrimp paste small industry (Umam et al., 2017). There are several fishery resources in Sumenep, namely general fisheries, freshwater fisheries and marine fisheries. An area in Sumenep that has the potential to develop marine fisheries is East Ambunten Village. The village is famous for processing fisheries from the results obtained, for example smoked fish, salted fish, and petis (Fatmawati et al., 2020).

Based on observations of class VIII students at MTsN 2 Sumenep school, with limited face-to-face learning in the process of teaching and learning activities using cellphones, both materials and assignments use a lot of whatsapp so that students focus more on cellphones and read a lot of material via the internet. Meanwhile, science textbooks are rarely opened by students. Local local culture found in the Sumenep area in the form of making rebon shrimp paste has a relationship with science material in the fields of physics (pressure of solids and liquids), chemistry (additives), biology (conventional biotechnology). Therefore, it is necessary to develop learning media in the form of "Development of ethnoscience-based integrated science e-modules using flipbooks on the theme of shrimp paste". The development of learning media associated with the local culture of Sumenep, namely the process of making shrimp paste using traditional methods, is expected to provide easy understanding of concepts to students. Students can read e-modules via cellphone with the e-module link provided by the teacher. So with this research students can do more meaningful learning by linking indigenous science in the process of making shrimp paste with scientific science in science materials.

Based on this statement, it is necessary to develop ethnoscience-based integrated science e-modules using flipbooks on the theme of rebon shrimp paste. Relevant research conducted by (Ahmadi et al., 2019) on ethnoscience-based science teaching materials shows the use of ethnoscience-based science teaching materials can affect learning outcomes and affective learning outcomes of students, namely experiencing an increase with the category obtained by moderate students' cognitive learning outcomes with an average value of 0.45 N-Gain. The difference in this relevant research is that the media is different, namely science teaching materials while this research is in the form of developing integrated

science e-modules using flipbooks, in relevant research the material used is global warming while this research is substance pressure, additives, and conventional biotechnology

This research was conducted using class VIII and class IX materials. The e-module contains physics (pressure of solid and liquid substances, and osmosis), chemistry (additives in food and their impact on human health, and biology (conventional biotechnology). The purpose of this study was to determine the feasibility of e-modules and student readability of ethnoscience-based integrated science e-modules using flipbooks on the theme of shrimp paste.

METHOD

The type of research used is development research. This research is focused on developing and producing learning media in the form of ethnoscience-based integrated science e-modules using flipbooks. This development was carried out to determine the feasibility of media and student readability of the e-modules developed.

The development model used in the research is the ADDIE model. The ADDIE development model is one of the development models centered on processes or procedures in developing a product or improving a product (Maulana & Junianto, 2022). The ADDIE development model is one of the development model designs that are widely used in developing teaching materials. The ADDIE model consists of 5 stages, namely; Analysis, Design, Development, Implementation and Evaluation (Cahyadi, 2019). The steps of developing ethnoscience-based integrated science e-modules with the ADDIE model can be seen in the following Figure 1.
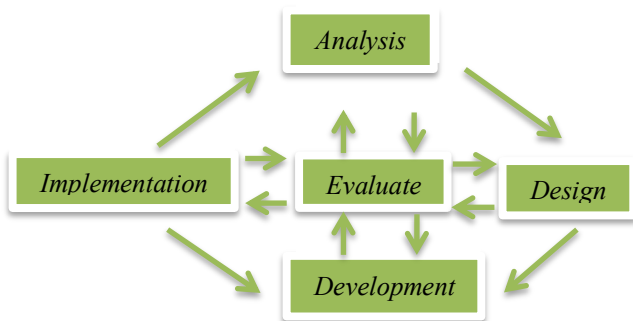

Figure 1. ADDIE development model design (Amania et al., 2021)

Research on the development of ethnoscience-based integrated science e-modules using flipbooks was carried out in the even semester of the 2021/2022 academic year on May 17, 2022. This research was conducted by sampling with Purposive sampling technique.

Purposive sampling technique is a technique with certain considerations based on the suitability of the characteristics found in prospective respondents with predetermined criteria (Iryani & Suriatie, 2021). Purposive sampling technique includes Non probability sampling technique (Sugiyono, 2014). The population in this study were all class VIII MTs Negeri 2 Sumenep and the sample used was 30 students of class VIII-B at MTs Negeri 2 Sumenep.

This research is a media feasibility validation sheet and a student readability questionnaire. Data collection techniques were observation, questionnaire and documentation. The data analysis technique used was media feasibility analysis consisting of e-module validity test and e-module reliability and student readability analysis.

Assessment of the feasibility of e-modules is obtained based on the results of the validity and reliability of e-modules. Ethnoscience-based integrated science e-module validation testing using flipbooks is carried out by media experts, material experts and junior high school science teachers. The validity test is used to measure the feasibility of integrated science e-modules. Data analysis of e-module feasibility was obtained using formula 1.

$$Va = \frac{Tse}{Tsh} \, x100 \cdots\cdots\cdots\cdots\cdots\cdots\cdots(1)$$

Information:
Va = expert validity
Tse =Total empirical score (validation score by validator)
Tsh = Total maximum score (maximum expected)
(Sugianto et al., 2018)

The results of the calculation of the validity value are then interpreted based on the scale according to Suryani et al. (2022). E-modules are declared valid if they reach a percentage of 61%-80% and are declared very valid if the validity value reaches 81%-100%. Meanwhile, to determine the reliability of ethnoscience-based integrated science e-modules using flipbooks, it is calculated using the Borich formula in formula 2.

$$(R) = (1 \frac{A-B}{A+B}) \times 100\% \cdots\cdots\cdots\cdots\cdots\cdots(2)$$

Modified from Sakdiah et al., (2020)
Information:
R = percent agreement
A = higher scores given by validators
B = lower score given by the validator

Furthermore, it is interpreted with a scale according to Sarman et al., (2019). E-modules can

be declared reliable if the reliability value obtained is 60% < R ≤ 80%. And the e-module is declared very reliable if the reliability value obtained is 80% < R ≤ 100%.

The readability questionnaire was given to students to measure student readability of ethnoscience-based integrated science e-modules using flipbooks. The results of the student readability assessment were calculated using the formula 3.

$$K = \frac{\text{Tsp}}{\text{Tsm}} \; x \; 100 \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots(3)$$

Information:
K = average value
Tsp = number of scores obtained
Tsm= maximum number of scores
Akbar (2013) in (Sugianto et al., 2018)

The readability of the e-module can be known by adjusting the assessment results with predetermined criteria. Furthermore, the results of the student readability assessment were interpreted on a scale according to Sugianto et al. (2018). The readability of the e-module can be categorized as good if the student readability value obtained is 50.01% ≤R≤75% and categorized as very good if the value obtained is 75.01% ≤R≤100%.

RESULTS AND DISCUSSION

The ethnoscience-based integrated science e-module media using the rebon shrimp paste theme flipbook was developed using the ADDIE development design model (Analysis, Design, Development, Implementation, Evaluate). The first stage is analysis. There are 4 analyses conducted, namely curriculum analysis, student analysis, concept analysis, and analysis of learning media availability. In curriculum analysis, the instrument used is observation. Observations were made at MTs Negeri 2 Sumenep to find out the curriculum used in the school. The results of observations show that schools use teaching materials for junior high school / MTs class VIII and IX curriculum 2013 revised 2017. The Basic Competencies (KD) used are class VIII KD 3.8 and KD 3.6, and class IX KD 3.7. The material contained in the KD is solid and liquid pressure material, additives, and conventional biotechnology related to science concepts found in the local culture of making rebon shrimp paste in the Ambunten area, Sumenep.

Furthermore, student analysis, the instrument used is observation and direct observation by looking at the value of student learning outcomes in the daily tests of class VIII-B students. The results of the student analysis show that students in class VIII-B have different characteristics in

learning. Students prefer the use of android-based learning media or by using cellphones. Direct observation of the object by looking at student learning outcomes on daily tests obtained is not optimal. The reason is because the teaching materials used are more dominant using package books. Concept analysis is carried out through literature study, so that it can be used as a basis for compiling learning materials systematically and compiling learning objectives on the media. Analysis of the availability of learning media is done through direct observation at school and conducting literature reviews on journals and other relevant research. The observation results show that there is no learning media that is interesting and can visualize abstract material. In addition, there is no learning media that integrates the local culture of the surrounding community in science learning. The results of observations of local culture around show that in the Ambunten area, Sumenep Regency there is a local culture that has special characteristics, namely the process of making shrimp paste in the Ambunten area, Sumenep. The distinctive feature is that before the fermentation process the shrimp is wrapped first using teak leaves.

Science materials in physics, chemistry, and biology, as well as mathematics in e-modules associated with the theme of making shrimp paste are presented in a Webbed type of integration model, so that e-modules become a source of integrated science learning. The theme of rebon shrimp paste that is raised from the local culture of the community is then combined with several subjects that present concepts from physics, chemistry, biology, and mathematics in a learning process.

The second stage is the design stage. The activities carried out are by reviewing solid and liquid pressure materials, additives, and conventional biotechnology related to the making of shrimp paste, learning strategies, and student assessment instruments. And planning for learning objectives and learning evaluation tools with the learning approach that will be used in the integrated science e-module. In addition, it compiles assessment instruments used in the form of media expert validation sheets, material experts, and questionnaires using a Likert scale.

The third stage is the development stage, which is an activity in following up the design specifications into physical form, so as to produce ethnoscience-based integrated science e-module products using the rebon shrimp paste theme flipbook. In obtaining e-module products, it is necessary to prepare material that is adapted to the concept map of solid and liquid pressure material, additives, and conventional biotechnology which

is linked to scientific concepts in making shrimp paste. Furthermore, developing supporting media to explain the material in the e-module, one of which is an animated video. This development stage also carried out validity and reliability assessments on e-modules by media experts, material experts, and science teachers. During the validation process there were revisions from media experts and material experts, and the need to revise the e-module to achieve learning objectives.

The fourth stage is implementation, which is an activity to apply ethnoscience-based integrated science e-modules using the rebon shrimp paste theme flipbook that has been developed in real situations in the classroom. The application of e-modules is implemented to class VIII-B students at MTsN 2 Sumenep with a total of 30 students conducted directly or offline. During the implementation process, the e-module is applied by delivering the material in the e-module which is connected to the local culture of making shrimp paste and delivered in accordance with the contents of the e-module briefly contained in the e-module. Students were given the e-module link and explained how to access the e-module, the content in it, and how to use the buttons on the e-module and how to do the quiz independently after reading the e-module content.

The evaluation stage is carried out to provide an assessment of the e-modules that have been developed. Formative evaluation is carried out at each stage of the ADDIE development model, to evaluate the process of preparing e-modules. One of the summative evaluation results is that at the development stage carried out by media expert validation and material expert validation, there are revisions to pay attention to the layout of images, symbols, and the link to scientific studies in the shrimp paste production process to be reviewed more in depth and in the questionnaire in the instructions section to be shortened. Summative evaluation is carried out at the end of the stage to maximize the preparation of integrated science e-modules after e-modules are applied to students.

Media Feasibility Assessment

Media feasibility validation analysis is used to determine the level of feasibility of ethnoscience-based integrated science e-modules that have been developed. The feasibility of ethnoscience-based integrated science e-modules is carried out before being applied to students. There are 2 validators involved in assessing the feasibility of media, namely science education lecturers at Trunojoyo University Madura, as validator 1 and science teachers at MTsN 2 Sumenep as validator 2.

Calculation of validation of the feasibility of ethnoscience-based integrated science e-modules using flipbooks is done using formula 1 and reliability values using formula 2. Determination of the validity and reliability of e-modules is adjusted to the predetermined criteria. The results of the media assessment on ethnoscience-based integrated science e-modules using flipbooks on the theme of rebon shrimp paste can be seen in Table 1.

Table 1. Results of recapitulation of feasibility test of ethnoscience-based integrated science e-module

Number	Assessment Criteria	Validity		Reliability	
		Average Validity (%)	Description	Average reliability (%)	Description
1.	Letter	83.33	Very valid	90.47	Very reliable
2.	Design	91.66	Very valid	100	Very reliable
3.	Consistency	87.5	Very valid	95.23	Very reliable
4.	Image	81.25	Very valid	92.85	Very reliable
5.	Operation of the e-module	100	Very valid	100	Very reliable
	Average score	88.75	Very valid	95.71	Very reliable

Based on the validity and reliability of ethnoscience-based integrated science e-modules using flipbooks on the theme of rebon shrimp paste, the overall average score is 88.75% with a very valid category and the overall reliability value is 95.71% with a very reliable category.

The results of the recapitulation of the first media aspect, namely the letter criteria, obtained an average validity value of 83.33% with a very valid category and an average reliability value of

90.47% with a very reliable category. This shows that the ethnoscience-based integrated science e-module on the criteria of letters is feasible to use and is appropriate and easy to read by users. E-modules that contain the context of science material that is connected to local culture make students more applicable to the problems found around. And will provide meaningful learning to students because they will be more active and independently learn in e-modules, in accordance

with Jerome Brunner's cognitivism learning theory. Students are emphasized to be more active in carrying out activities, thinking, composing a concept and providing meaning from the learning that has been done. In discovery learning, students are required to be active in finding solutions to problems and then can obtain new meaningful knowledge. In Sundari & Fauziati, (2021) stated that in Brunner's learning theory information (knowledge) can be obtained through the process of a person's interaction with the environment around him. In accordance with this research, after the application of ethnoscience-based e-modules to students causes changes in behavior in these individuals. Students have a more caring attitude towards the environment and are actively more applicable to the environment around students. In addition, students know more and grow an attitude of respect for their regional culture.

The second indicator on the font criteria is the clarity of the font with the e-module background, which obtained a validity value of 87.5% with a very valid category and a reliability value of 85.71% with a very reliable category. The font criteria in statement number 2 were suggested by the media expert validators of junior high school science teachers to make the font model used more diverse and attractive. The font model is improved by using several fonts that are consistently used in each chapter and sub-chapter title accompanied by an image. The font model is very influential on student interest in studying e-modules, so that students in learning become more interested in reading the contents of the e-module. This is supported by research conducted by Putri et al., (2022) which suggests that using the appropriate and appropriate font type, font size, color accuracy in the text and e-module background will motivate students to learn the contents of the e-module because the e-module has an attractive appearance.

The results of the recapitulation of the second media aspect, namely the design criteria on ethnoscience-based integrated science e-modules, obtained an average validity value of 91.66% with a very valid category and an average reliability value of 100% with a very reliable category. The third indicator statement discusses the suitability of the e-module content layout between one another, the validity value obtained is 75% with a valid category and the reliability value obtained is 100% with a very reliable category. The assessment conducted by the validator on the design criteria did not get any suggestions from the two validators. Based on the validity and reliability assessment, it can be seen that in the design aspect, the e-module cover design used is attractive and the cover layout is appropriate and

able to attract students' attention. The layout of the e-module content in accordance with each other needs to be considered properly. The arrangement of the e-module cover and the neatness of the cover design are the main things that need to be considered because they are the first things seen by students. This is supported by research conducted by Winatha et al. (2018), which states that the appearance design of each part of the e-module can attract and arouse students' attention to learning. With the emergence of student interest, students feel like seeing the contents of the e-module.

The results of the third criteria recapitulation, namely consistency, obtained an average validity value of 87.5% with a very valid category and an average reliability value of 95.23% with a very reliable category. The third statement discusses the writing of consistent numbering and symbols with a validity value of 75% with a valid category and a reliability value of 100% with a very reliable category. In the consistency criteria, there are suggestions from media expert validators that the layout of numbers and symbols must be considered neatness and consistency, so that users when reading the e-module are not confused. This is supported by research conducted by Retnosari & Hakim, (2021) which states that in e-module teaching materials with the layout of page numbers and chapter titles having an appropriate and proportional size can make it easier for students to understand the material. Symbols, icons and terms in providing an overview of a concept that is interpreted need to be presented consistently in each part of the learning media.

The recapitulation of the fourth media aspect is the image criteria on the e-module with an average validity value obtained of 81.25% with a very valid category and an average reliability value obtained of 92.85% with a very reliable category. The first statement, namely the suitability of the image with the material used, obtained a validity value of 87.5% with a very valid category and a reliability value of 85.71% with a very reliable category. In this statement there is a suggestion from the media expert validator of junior high school science teacher, the picture on the cover of the e-module should be replaced with a picture of shrimp in an aquarium, in accordance with the theme discussed, namely making rebon shrimp paste. So that in terms of the e-module cover, students can already see the overall context that will be discussed in the content of the e-module. This is supported by research conducted by Winatha et al. (2018) which states that the images used in the e-module must be appropriate in visualizing the material

description discussed. The description of the material is not only in the form of text but there needs to be an image to provide an explanation of the abstract material. So that it supports the explanation of material that is difficult for students to understand.

The fifth criterion media aspect is the operation of the e-module with a validity and reliability value obtained of 100% with a very valid and very reliable category. The e-module is equipped with navigation buttons that make it easier for students to read the e-module like reading a real book. This is supported by research conducted by Rindaryati, (2021) which states that the learning media using Flip PDF Professional is equipped with navigation buttons consisting of zoom in, back, previous page, next page, search, select text and there are several other navigation buttons. One of them is thumbnails search on the e-module can be used to view pages, material

content according to the topic, or the desired video, then the reader can go directly to the intended page.

Material Aspect Feasibility Assessment

The feasibility test of ethnoscience-based integrated science e-modules using the rebon shrimp paste theme flipbook on the material aspect was assessed by 2 material expert validators. Calculation of the validation of the feasibility of material in ethnoscience-based integrated science e-modules using the rebon shrimp paste theme flipbook using formula 1 and the reliability value using formula 2. Determination of the validity and reliability criteria of the material in the e-module is adjusted to the predetermined criteria. The results of the material aspect assessment on ethnoscience-based integrated science e-modules using flipbooks can be seen in table 2.

Table 2. Results of recapitulation of feasibility test of ethnoscience-based integrated science e-module material aspects

Number	Assessment criteria	Validity		Reliability	
		Average validity (%)	Description	Average reliability (%)	Description
1.	Content eligibility	87.5	Very valid	85.71	Very reliable
2.	Presentation feasibility	87.5	Very valid	92.85	Very reliable
3.	Language assessment	83.33	Very valid	90.47	Very reliable
	Average score	86.11	Very valid	89.66	Very reliable

Based on Table 2, it shows the results of the average value of the validity and reliability of the material in the ethnoscience-based integrated science e-module provided by the two material expert validators. In the material aspect, there are 3 assessment criteria, namely content eligibility, presentation feasibility, and language assessment. Each criterion is then developed into several statements. In the material aspect, the overall average validity value was 86.11% with the very valid category and the overall average reliability value was 89.66% with the very reliable category. Based on the analysis, it shows that the science material contained in the e-module in the form of solid and liquid pressures, additives, and conventional technology is very valid and very reliable so that it is suitable for use in learning at MTsN 2 Sumenep.

The results of the recapitulation of the feasibility test of the material aspect e-module in the first assessment criterion, namely the content feasibility criteria, obtained an average validity value of 87.5% with a very valid category and an average reliability score of 85.71% with a very reliable category. The second statement indicator

discusses the accuracy of materials/contents with the concept of substance pressure materials (solid and liquid), additives, and conventional biotechnology with a validity value of 87.5% obtained in the very valid category and a reliability value obtained of 85.71% in the very reliable category. In the aspect of the concept of the material in the e-module in the transformation of original science into scientific science in the process of making shrimp paste, there are suggestions for improvement by the validator of science lecturers at Trunojoyo University Madura to be further reviewed from various aspects of making shrimp paste related to science materials. These aspects can be reviewed from the color, the packaging process, the drying process, the tools and materials used in making rebon shrimp paste. With the transformation of original science into scientific science in making shrimp paste, which is reviewed more broadly from various aspects, it will make students' insights more applicable and know about various activities in making shrimp paste, there is a science concept. The preparation of the material in the e-module is also prepared by applying science materials in daily life, especially

in the activity of making shrimp shrimp paste. In addition, it is also associated with other examples in daily life related to the concept of science in matter of substance pressure, additives, and conventional biotechnology. Presenting examples relevant to daily life will make learning meaningful to students and the material is easy to remember. This is in accordance with the theory of cognitivism, in cognitivism using Ausubel's theory, meaningful learning aims to make discoveries by integrating the knowledge that students have previously obtained with real new knowledge and in accordance with daily events carried out in the learning process at each stage (Kinasih & Sinaga, 2020).

The results of the recapitulation of the second criterion, the feasibility of presentation with the average validity value obtained, which is 87.5% with the very valid category and the average reliability value obtained a score of 92.85% with the very reliable category. The second statement discusses the supporters of the presentation of e-modules that are consistent with the validity value obtained at 87.5% with the very valid category and the reliability value obtained at 85.71% with the very reliable category. The material in the e-module to be clear and not abstract is presented interactively through the use of images, videos and hyperlinks for formative practice questions. This is in line with the opinion (Aryawan et al., 2018) which states that each image in the material is able to provide a conceptual understanding and clarify complex and abstract material into a simple and concrete understanding. So that students are able to remember and the messages contained in the pictures have an impact on learning motivation and the achievement of learning goals. The videos contained in the e-module are able to improve student learning outcomes.

The third assessment criterion is the language assessment on the e-module which obtained an average validity score of 83.33% with

the very valid category and the reliability score obtained by 90.47% with the very reliable category. The second statement indicator is related to the suitability of language with the level of development or age of the student obtained a validity score of 75% with the valid category and the reliability score obtained was 100% with the very reliable category. The validity value obtained shows that the language style used in the e-module is easy to understand and is in accordance with the level of cognitive development of students. The language used in the e-module is prepared by taking into account the age of junior high school students so that it is easy to understand and does not cause difficult interpretations and double meanings. This is supported by the opinion expressed by Winatha et al., (2018) who stated that the use of simple language will have an impact on the understanding of the material when users read the e-modules.

Results and Analysis of Student Readability

Analysis of student readability data was carried out to determine the level of student readability of the media that had been developed in the form of ethnoscience-based integrated science e-modules using the rebon shrimp paste theme flipbook. The student readability questionnaire was filled in by students of class VIII-B MTsN 2 Sumenep with a total of 30 students to find out the readability of students after being given an ethnoscience-based integrated science e-module using a flipbook. The student readability questionnaire consists of 3 assessment criteria used, namely sentence length with 4 statements, word difficulty with 2 statements, and language with 4 statements.

Calculation of student readability using formula 3. Determination of student readability is adjusted to the specified criteria. The recapitulation of student readability results can be seen in table 3.

Table 3. Recapitulation of students' readability score of e-modules

No.	Assessment criteria	Validity		Reliability	
		Average validity (%)	Description	Average reliability (%)	Description
1.	Assessment criteria	87.5	Very valid	85.71	Very reliable
2.	Presentation feasibility	87.5	Very valid	92.85	Very reliable
3.	Language assessment	83.33	Very valid	90.47	Very reliable
	Average score	86.11	Very valid	89.66	Very reliable

Table 3 shows the average value of student readability on each assessment criterion obtained from the two validators. The student readability

questionnaire consists of 10 statements which include positive statements in question numbers 1,2,5,7, and 10 while negative statements are in

question numbers 3,4,6,8, and 9. The average percentage of student readability as a whole obtained a value of 88.19% in the very good category. This shows that the level of student readability of e-modules is very good because the preparation of e-modules pays attention to technical requirements, one of which is the use of simple and easy to understand language.

The results of the student readability value of the e-module on the short sentence length indicator obtained an average value of 87.5% in the very good category. One of the statements that discussed the sentences presented in the e-module was too complicated and confusing obtained a percentage value of student readability of 88.33% with a very good category. The percentage results show that the e-module is presented using simple and straightforward language, so that students in reading the e-module become easier to understand the material and do not confuse students about the information contained in the e-module. The concise arrangement of sentences in the e-module makes students not bored of learning. This is in accordance with research conducted by Sugianto et al. (2018) which states that the short length of sentences used in e-modules will have an impact on students in understanding the material content in the e-module.

The second indicator is the level of word difficulty. The average percentage value of student readability in the aspect of average difficulty level obtained a score of 85% in the very good category. Statement number 6 discusses foreign or scientific language in e-modules that is difficult to understand with a percentage value of student readability obtained of 75.83% in the very good category. These results indicate that the scientific language presented in the e-module can be understood by students, with the presentation of material or terms or foreign languages in e-modules equipped with pictures. So that students more easily understand the content presented in the e-module. This is in accordance with research conducted by Sugianto et al. (2018) which states that the use of words in e-modules must be adjusted to the cognitive development of students. The choice of words used in the e-module must be simple according to the age of the students, besides that it still has to adjust to the completeness of the material discussed.

The third indicator assessed is language. The results of the average student readability percentage in the linguistic aspect obtained a value of 92.08% in the very good category. One of the statements in this aspect discusses the language used in accordance with the age of students with a percentage value of student readability of 95% in the very good category. This shows that the

preparation of e-modules in the language aspect is in accordance with the cognitive and age of students. The preparation of e-modules with the use of language and symbols must be considered. In accordance with research conducted by Sugianto et al., (2018) which states that the presence of symbols or icons contained in e-modules should not be excessive, because it can cause the focus of student attention to be diverted or interfere with student concentration when understanding the material in the e-module.

CONCLUSIONS AND SUGGESTIONS
Conclusion

Based on the results and discussion of ethnoscience-based integrated science e-modules using flipbooks on the theme of rebon shrimp paste, it shows that the average validity of e-modules obtained a value of 88.75% with a very valid category and an average reliability value of 95.71% with a very reliable category. The average validity value of the material aspect obtained a value of 86.11% with a very valid description and an average reliability value of 89.66% with a very reliable description. Based on these results, it shows that the ethnoscience-based integrated science e-module using the rebon shrimp paste theme flipbook is suitable for use in science learning. Ethnoscience-based integrated science e-modules using flipbooks developed can be concluded that student readability of e-modules is very good with an average overall readability percentage of 88.19%. with an average overall percentage value of 89.42%.

Suggestion

Based on the results of the research that has been conducted, there are several suggestions given by the researcher, among others:
1. The use of ethnoscience-based integrated science e-modules using the rebon shrimp paste theme flipbook requires a stable internet network, so it is necessary to publish files offline and on flash storage in the flipbook application currently cannot be accessed freely or paid.
2. The use of links on quiz questions in the e-module, needs to be developed again so that the link can be accessed directly without the need to copy the link. Because it affects when students understand or work on evaluation questions in the e-module.

REFERENCES

Ahmadi, Y., Astuti, B., & Linuwih, S. (2019). Bahan Ajar Ipa Berbasis Etnosains Tema Pemanasan Global Untuk Peserta Didik

Smp Kelas Vii. *Jurnal Pendidikan Fisika Unnes*, *8*(1),53–59. Https://Doi.Org/10.15294/Upej.V8i1.29512

Amania, M., Nugrahanta, G. A., & Kurniastuti, I. (2021). Pengembangan Modul Permainan Tradisional Sebagai Upaya Mengembangkan Karakter Adil Pada Anak Usia 9-12 Tahun. *Jurnal Elementary School*, *8*(2), 237–251. Https://Doi.Org/10.31316/Esjurnal.V8i2.1230

Arsanty, V. N., & Wiyatmo, Y. (2017). Pengembangan Perangkat Pembelajaran Fisika Berbasis Model Pembelajaran Sts Dalam Peningkatan Penguasaan Materi Dan Pencapaian Kreativitas Peserta Didik Sma. *Jurnal Pendidikan Fisika*, *6*(1), 23–32.

Aryawan, R., Sudatha, G. W., Adrianus, & Sukmana, W. I. Y. (2018). Pengembangan E-Modul Interaktif Mata Pelajaran Ips Di Smp Negeri 1 Singaraja. *Jurnal Edutech Universitas Pedidikan Ganesha*, *6*(2),180-191.

Atmojo, S. E., & Lukitoaji, B. D. (2020). Pembelajaran Tematik Berbasis Etnosains Dalam Meningkatkan Literasi Budaya Dan Kewargaan Siswa Sekolah Dasar. *Jurnal Inspirasi Pendidikan*, *10*(2), 105-113. Http://Dx.Doi.Org/ 10.2183

Cahyadi, R. A. H. (2019). Pengembangan Bahan Ajar Berbasis Addie Model. *Islamic Education Journal*,*3*(1),35–43. Https://Doi.Org/10.21070/Halaqa.V3i1.2124

Deliany, N., Hidayat, A., & Nurhayati, Y. (2019). Penerapan Multimedia Interaktif Untuk Meningkatkan Pemahaman Konsep Ipa Peserta Didik Di Sekolah Dasar. *Jurnal Pendidikan Dan Pembelajaran*, *17*(2), 90–97.

Dwiyanti, I., Supriatna, A. R., & Marini, A. (2021). Studi Fenomenologi Penggunaan E-Modul Dalam Pembelajaran Daring Muatan Ipa Di Sd Muhammadiyah 5 Jakarta. *Jurnal Ilmiah Pendidikan Dasar*, *06*(01), 74–88. Http://Dx.Doi.Org/10.23969/Jp.V6i1.4175

Fatmawati, Hermanto, B., & Kurdi, M. (2020). Kelayakan Finansial Agroindustri Terasi Di Desa Ambunten Timur Kecamatan Ambunten Kabupaten Sumenep. *Jurnal Agri Sains*, *4*(2).

Hadi, W. P., Sari, F. P., Sugiarto, A..Mawaddah, W. (2019). Terasi Madura: Kajian Etnosains Dalam Pembelajaran Ipa Untuk Menumbuhkan Nilai Kearifan Lokal Ldan Karakter Siswa Madura. *Jurnal Inovasi Pendidikan Sains*, *10*(1), 45–55.

Haspen, C. D. T., Syafriani, & Ramli. (2021).

Validitas E-Modul Fisika Sma Berbasis Inkuiri Terbimbing Terintegrasi Etnosains Untuk Meningkatkan Kemampuan Berpikir Kreatif Peserta Didik. *Jurnal Eksakta Pendidikan*, *5*(1),95–101. Https://Doi.Org/10.24036/Jep/Vol5-Iss1/54.

Hermawati, H. F., Krisnanda, B. I., Nurjanah, R., Hadi, T. S., Kristanti, E. D., & Fadika, N. (2021). Pemanfaatan Ikan Rucah Dalam Pembuatan Terasi Dengan Bioteknologi Sederhana. *Jurnal Pendidikan Biologi*, *2*(1), 33–37. Https://Doi.Org/10.31002/Nectar.V2i1.1468

Himmah, F., & Martini. (2017). Pengembangan Multimedia Interaktif Menggunakan Ispring Suuite 8 Pada Sub Materi Zat Aditif Untuk Meningkatkan Hasil Belajar Siswa Smp Kelas Viii. *E-Journal Unesa*, *05*(02), 73–82.

Iryani, I., & Suriatie, M. (2021). Bimbingan Kelompok Dengan Teknik Sinema Edukasi Untuk Meningkatkan Kesadaran Multikultural Siswa Kleas Xi Di Sma Isen Mulang Palangka Raya. *Jurnal Bimbingan Dan Konseling Pandohop*, *I*(2), 31–36. Https://Doi.Org/10.37304/Pandohop.V1i2.346

Izma, P., Siahaan, P., Purwanto, & Basori, H. (2019). Penggunaan Bahan Ajar Berbasis *Socioscoentific Issues* Untuk Meningkatkan Pemahaman *Nature Of Science* Siswa Smp Pada Mata Tata Surya. *Jurnal Wahana Pendidikan Fisika*, *4*(1), 11–17. Https://Doi.Org/10.17509/Wapfi.V4i1.1576

Kinasih, S., & Sinaga, K. (2020). Kajian Penerapan Teori Pembelajaran Bermakana Berdasarkan Perspektif Alkitabiah Pada Pembelajraan Kimia Materi Hidrokarbon [A Study On The Application Of Ausubel's Meaningful Learning Theory On Hydrocarbon Chemical Learning Based On A Biblical Pers. *Polyglot: Jurnal Ilmiah*, *16*(2), 141–153. Https://Doi.Org/Doi:Dx.Doi.Org/10.19166/ Pji.V16i2.2128

Mantaka, I. N., Sendratari, L. P., & Margi, K. (2017). Pengintegrasian Kearifan Lokal Subak Abian Catu Desa Sambirenteng Buleleng Bali Sebagai Sumber Belajar Ips Di Smp. *Jurnal Pendidikan Ips Indonesia*, *1*(2), 85–95.

Maulana, M. I., & Junianto, E. (2022). Penerapan Model Addie Dalam Pembuatan Permainan Edukasi Bahasa Inggris Berbasis Android. *Jurnal Responsif*, *4*(1), 12–22.

Mustikasari, V. R., Annisa, M., & Munzil. (2017).

Identifikasi Miskonsepsi Konsep Tekanan Zat Siswa Kelas Viii-C Smpn 1 Karangploso Semester Genap Tahun Pelajaran 2017-2018 Vita. *Jurnal Pembelajaran Sains*, *1*(2),39-50. Https://Doi.Org/Http://Journal2.Um.Ac.Id/Index.Php/

Nuralita, A. (2020). Analisis Penerapan Model Pembelajaran Berbasis Etnosains Dalam Pembelajaran Tematik Sd. *Jurnal Mimbar Pgsd Undiksha*, *4*(1), 1–8. Https://Doi.Org/Https://Ejournal.Undiksha.Ac.Id/Index.Php

Nurhairani. (2018). Pendekatan Keterampilan Proses Pada Mata Kuliah Konsep Dasar Ipa Sd. *Jurnal Sekolah*, *2*(2), 1–8.

Nurhidayati, S., & Khaeruman. (2017). Pengembangan Bahan Ajar Bioteknologi Berbasis Potensi Lokal. *Jurnal Pendidikan Mandala*, *2*(2), 87–91.

Pamungkas, A., Subali, B., & Lunuwih, S. (2017). Implementasi Model Pembelajaran Ipa Berbasis Kearifan Lokal Untuk Meningkatkan Kreativitas Dan Hasil Belajar Siswa Aji. *Jurnal Inovasi Pendidikan Ipa*, *3*(2),118–127. Https://Doi.Org/Http://Journal.Uny.Ac.Id/Index.Php/Jipi Jurnal

Pingge, H. D. (2017). Kearifan Lokal Dan Penerapannya Di Sekolah. *Jurnal Edukasi Sumba*, *01*(02), 128–135.

Putri, A., Sjaufuddin, & Berlian, L. (2022). *Pengembangan E-Modul Ipa Berbasis Adobe Flash Pada Tema Makananku Kesehatanku Untuk Kelas Viii Smp*. *6*(1), 143–150. Https://Doi.Org/10.33369/Pendipa.6.1.143-150

Putri, W. A., & Slamet, L. (2021). Pengembangan E-Book Interaktif Mata Pelajaran Dasar Listrik Dan. *Jurnal Pendidikan Tambusai*, *5*(3), 10799–10813.

Retnosari, D. S., & Hakim, L. (2021). E-Modul Interaktif Perbankan Syariah Sebagai Bahan Ajar Alternatif Dalam Menunjang Perkuliahan Daring Mahasiswa. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *5*(2), 206–214.

Rikah, & Widodo, A. (2019). Pkm Kelompok Usaha Terasi Desa Bonang Kecamatan Lasem Dalam Upaya Menghadapi Permasalahan Cuaca. *Journal Of Dedicators Community Unisnu Jepara*, *3*(1), 44–52. Https://Doi.Org/10.34001/Jdc.V3i1.792

Rindaryati, N. (2021). E-Modul Counter Berbasis Flip Pdf Pada Mata Pelajaran Penerapan Rangkaian Elektronika. *Jurnal Ilmiah Pendidikan Dan Pembelajaran*, *5*(2), 192–199. Http://Dx.Doi.Org/10.23887/Jipp.V5i2

Rinto. (2018). *Manfaat Fungsional Produk Fermentasi Hasil Perikanan Indonesia*. Upt Universitas Sriwijaya.

Sa'diyah, K. (2021). Pengembagan E-Modul Berbasis Digital Flipbook Untuk Mempermudah Pembelajaran Jarak Jauh Di Sma. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(4),1298–1308. Https://Edukatif.Org/Index.Php/Edukatif/

Safitri, A. N., Subiki, & Wahyuni, S. (2018). Pengembangan Modul Ipa Berbasis Kearifan Lokal Kopi Pada Pokok Bahasan Usaha Dan Energi Di Smp. *Jurnal Pembelajaran Fisika*, *7*(1),22–29. Https://Doi.Org/10.19184/Jpf.V7i1.7221

Sakdiah, H., Novita, N., & Muliani. (2020). Pengembangan E-Modul Berbasis Stem Terintegrasi Pembelajaran Inkuiri Pada Mata Kuliah Kajian Fisika Kejuruan. *Jurnal Pendidikan Fisika*, *9*(2), 99–104.

Sari, R., Harijanto, A., & Wahyuni, S. (2018). Pengembangan Lks Ipa Berbasis Kearifan Lokal Kopi Pada Pokok Bahasan Usaha Dan Energi Di Smp. *Jurnal Pembelajaran Fisika*, *7*(1), 70–77.

Sarini, P., & Selamet, K. (2019). Pengembangan Bahan Ajar Etnosains Bali Bagi Calon Guru Ipa. *Jurnal Matematika,Sains, Dan Pembelajarannya*, *13*(1), 27–39.

Sarman, Sudia, M., & Anggo, M. (2019). Pengaruh Pendekatan Kontruktivisme Terhadap Hasil Belajar Matematika Siswa Kelas Viii Mts Negeri 1 Buton Tengah. *Jurnal Penelitian Pendidikan Matematika*,*7*(1),43–56.

Sugianto, S. D., Ahied, M., & Hadi, W. P. (2018). Pengembangan Modul Ipa Berbasis Proyek Terintegrasi Stem Pada Materi Tekanan. *Journal Of Natural Science Education Reseach*, *1*(1), 28–39.

Sugiyono. (2014). *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*. Penerbit Alfabeta.

Sundarifauziati, E. (2021). Implikasi Teori Belajar Bruner Dalam Model Pembelajaran Kurikulum 2013.*Jurnal Papeda*, *3*(2),128-136.

Suryani, L., Romlah, S., Hodijah, N., & Taufik, A. N. (2022). Pengembangan E-Modul Ipa Berbasis Science Process Skills Dengan Tema Transportasi Si-Hijau Untuk Melatih Keterampilan Komunikasi Sains Siswa Smp Kelas Viii. *Pendipa Journal Of Science Education*, *6*(2), 322–330.

Susanti, E. D., & Sholihah, U. (2021). Pengembangan E-Modul Berbasis Flip Pdf Corporate Pada Materi Luas Dan Volume

Bola. *Jurnal Pendidikan Matematika*, *3*(1), 37–46.

Syaputra, E. E. N. (2019). Pandangan Guru Terhadap Integrasi Kearifan Lokal Dalam Pembelajaran Sejarah : Studi Deskriptif Di Beberapa Sma Di Bengkulu Selatan Dan Kaur. *Indonesian Journal Of Social Science Education*, *1*(1), 1–10.

Umam, K., Sari, Y. I., & Putra, D. F. (2017). Kontribusi Industri Terasi Terhadap Pendapatan Keluarga Dan Penyerapan Tenaga Kerja Di Desa Ambunten Timur Kecamatan Ambunten Kabupaten Sumenep. *Journal Unikama*, *2*(1), 90–97.

Untari, E. (2017). Probelematika Dan

Pemanfaatan Media Pembelajaran Sekolah Dasar Di Kota Blitar. *Jurnal Pendidikan Dasar Perkhasa*, *3*(1), 259–270.

Winatha, K. R., Suharsono, N., & Agustini, K. (2018). Pengembangan E-Modul Interaktif Berbasis Proyek Mata Pelajarn Simulasi Digital. *Jurnal Pendidikan Teknologi Dan Kejuruna*, *15*(2), 188–199.

Zahro, T., Widodo, D. W., & Sabtiawa, W. B. (2019). Keterlaksanaan Pembelajaran Menggunakan Komik Berbasis Etnosains Pada Materi Pemisahan Campuran Untuk Melatihkan Kemampuan Literasi Sains Siswa. *E-Jurnal Unesa*, *7*(2).