



## DEVELOPMENT OF MAGAZINE ON MADURA SALT THEME WITH ETHNOSCIENCE APPROACH TO IMPROVE STUDENT'S CHARACTER

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### Abstract

Ethnoscience based teaching material is interest research because it deals with efforts to develop and preserve the values of local wisdom that considered in curriculum development especially in the face of the increasingly rapid industrial revolution era. The purpose of this research was to find out the validity, reliability, level of readability, and student responses and it effects on student's character This type of research is the Research and Development (R & D). The research used the ADDIE development model which consists of analyze, design, development, implementation, evaluation stages. The subjects of this study were students from SMPN 2 Socah Bangkalan. Data analyzed with qualitative and quantitative descriptive. Based on the research, it can be concluded that the results of the average assessment of the feasibility test of the material aspects are 85.79% validity with appropriate categories, reliability 96.22% with very high- reliability categories and the media aspect is 91.76% validity with appropriately used without revisions, reliability of 95.08% with a very high. The results showed that integrated science magazine can develop student' character are working hard (mean=4.75), cooperation (mean=4.50), responsibility (mean=4.35) .

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## INTRODUCTION

Learning in Indonesia applies the 2013 curriculum which emphasizes four competencies are spiritual attitudes, social attitudes, knowledges, and skills. In these aspects it is hoped that character reinforcement will emerge in accordance with national education goals, are developing abilities and forming dignified national character and civilization in order to educate the nation's life. The aims was to developing potential students to become faithful, noble, healthy, knowledgeable, competent, creative, independent, and a democratic and responsible citizen.

Science learning in the 2013 curriculum in addition to achieving the goals saved in the curriculum is also required to be able to package learning in an integrated manner. Therefore, the teacher must be able to combine several subjects that have relevance so that students can get complete knowledge by combining several concepts, attitudes, and skills between essential competencies that have the potential to be integrated. In addition to combining several essential competencies, a teacher in 2013 curriculum learning must be able to create a learning atmosphere that is in by the characteristics of the material to deliver in the form of a variety of learning models with the support of teaching materials, media as a supplement. Teachers must be creative in choosing learning models, media or in developing instructional materials so that the delivery of the content is conceptually intact and enjoyable.

The contents of the 2013 curriculum state that science learning must be responsive to the development of science, culture, technology, and art that builds the curiosity and abilities of students. Therefore the creativity of teachers to associate material with other material in classroom learning is very necessary. Learning resources used by students can be the source from the community's living environment which packed with an attractive appearance. The science subjects in the 2013 curriculum can be used to support and improve the culture and the authenticity of the community level so that teachers must be responsive in developing teaching materials sourced from heritage and students, and are expected to apply in daily life (Sudarmin, Febu, Nuswowati, & Sumarni, 2017)(Khusniati, Parmin, & Sudarmin, 2017).Therefore,development of strong character is also the goal of science learning. Cultural community

knowledge can be used as a learning resource to develop strong character (Hadi&Ahied, 2017)

There are 370 ethnic groups in Indonesia, so it is essential to building(reconstruct) scientific knowledge or culture based on culture(Sudarmin, 2015). The term ethnoscience comes from the Greek word *ethos* which means 'nation' and the word *scientia* from Latin which means knowledge. Ethnoscience more or less mean knowledge possessed by a nation or more precisely by tribes or social groups and as a form of local wisdom. Ethnosains can be regarded as a system of knowledge and cognition typical of particular cultures. The various types of ethnos studies that have been investigated by anthropologists and the field of science have given rise to the ethnoscience nature of heritage as a system of knowledge, in the form of (a) classification through local language or local cultural categories, (b) moral rules or values based on cultural types local, (c) description of independent science systems found in the culture of community members or certain community groups(Sudarmin, Sumarti, & Woro Sumarni, 2018). Ethnoscience is a learning approach that has a close relationship with culture. Ethnoscience are knowledge possessed by a nation, tribe and specific social groups. Ethnography focuses more on cultures that classify existing environments or social situations. ethnicity is an activity that transforms between original science (knowledge relating to the facts of society) and scientific science. According to (Hadi & Ahied, 2017)ethnoscience is an attempt to reconstruct fundamental knowledge into scientific knowledge. According to (Rosyidah, Sudarmin, & Siadi, 2013) ethnoscience allows students to find information and translate indigenous community science into science; students can achieve meaningful learning. However, it can be concluded that ethnoscience based learning allows a connection between community culture and scientific knowledge so that learning becomes more meaningful.

The learning outcome must be comprehensive in combining the concepts and potential of local wisdom in the community. The natural environment can also be used as a learning resource by linking indigenous knowledge with science. As in the Philippines, the Kankanaey people have community knowledge derived from

ancestors regarding how to detect and anticipate hurricane disasters (Balay-as, Marlowe, & Gaillard, 2018) shows that there are still many. There are natural ingredients that can be used for medicine or herbal medicine that based on people's knowledge. Even the procedures relating to food sources can be used as learning resources to preserve the environment (Demi, 2016). Ethnoscience-based learning is also expected to foster a spirit of conservation. In Indonesia there are also studies related to constructing community knowledge based on local wisdom into scientific knowledge including the process of making brown sugar in the community of Kendal can be linked to science learning (Sumarni, Sudarmin, Wiyanto, & Supartono, 2016). Learning science concepts can be done by examining concepts by showing their application to phenomena in everyday life, especially community activities that have been carried out since a long time ago and even become a source of income. Learning both the model and the device must include the culture potential that becomes the daily life of the community, one of which is the PBL (Project-based Learning) learning model based on local wisdom (Annafi & Agustina, 2018). The concepts in people's lives is developed in the form of the development of a science module based on community life activities associated with the science concept (Fitria & Widi, 2015); (Nurkhalisa, Fari, & Ummayah, 2017); (Setiawan, Innatesari, & Sabtiawan, 2017).

Ethnoscience-based learning that is based on the diversity of local potential is able to foster student character (Yuliana, 2017); motivation (Zaitun, 2017) and soft skills (Khoiri, 2014). The progress of a nation is determined by how the character can be formed (Ardianti, 2019). Character education must start early (Rohendi, 2011) and contain components that include knowing, feeling and action, such as being a strong human being, having social tolerance and being diligent and tough not easily giving up (Astuti & Purbani, 2012). Measure character needs indicators to development of characters (Sakti, 2017). Character is the most important part in efforts to achieve educational goals as mandated in the law. Therefore, learning ethnoscience-based science is expected to meet the expected targets. Local wisdom based character which can be developed in science teaching and learning (Suastra, I.W., Jatmiko, B., Ristiati, N.P. & Rasmini. L.B.P, 2017).

However, the problem is teachers still can not link the cultural resources of surrounding communities with the essential competencies that exist in the junior

high school curriculum (Suastra, 2010). Moreover, The lack of knowledge of teachers to look for examples of events that contain local wisdom shown by the learning plan still few that relate to local wisdom. Therefore, the values of local wisdom integrating with science learning, it is hoped that science learning will be more meaningful and not just textbook oriented. In fact, many materials that are close to students' lives can be used as learning resources such as traditional kitchen utensils (Mulyani, 2013). Integration is expected to increase students' sensitivity to the surrounding environment. In Madura, one of the tribes in Indonesia is also rich in cultural treasures, one of which is salt. Salt farmers still use traditional methods of salt processing. The knowledge they have gained is hereditary based on the local wisdom of the Madurese people. This salt farmer activity that still uses local culture can be used as a reference for learning integrated science. References used for students are manifested in teaching materials in the form of magazines.

The problem encountered is that science teaching materials still present a display that is less attractive and still not utilized to link science with the culture of society. According to (Kurniasari, Rusilowati, & Subekti, 2014) science teaching materials still feature black and white images or illustrations and the use of grammar that is difficult for students to understand so that students' interest in reading without an order from the teacher is difficult. According to (Khairroh, Rusilowati, & Nurhayati, 2014) students tend to like reading picture books such as storybooks and magazines in the library. Reflects the students' reading interest in science teaching materials will be high if it is presented from grammar that is easily understood and accompanied by the use of interesting images.

Based on these problems, it is necessary to innovate Integrated Science teaching materials that use grammar that easily understand by presenting interesting images to increase students' reading interest. The innovation that can be done is to make Integrated Science magazine that has ethnoscience approach. According to (Yulianto & Rochma, 2013) the use of magazines as teaching materials can increase student motivation and creativity. Through the Integrated Science magazine, it expected that students' reading interest in science books would increased. The

Integrated Science magazine is conceptualized in such a way that it presents an easy-to-understand grammar, interesting images, stories or events in daily life related to the competencies taught and also contained elements of cohesiveness so that students' understanding is complete and comprehensive. Science learning by using ethnics-based modules aims to introduce students to the existence of facts or phenomena that develop in the community that can be linked to existing scientific science material as science. Ethnographic learning will lead students to know that the culture of society is a fundamental part of how to express and communicate for the development of knowledge and there is an increase in learning outcomes between students in learning with an ethnoscience approach, this is due to science learning using the ethnoscientific approach of students more interested and enthusiastic about learning because students feel science learning ethics is more fun than conventional knowledge. (Ibe & Nwosu, 2017) explained that science process skills can be improved using knowledge with ethnoscience strategies. Atmojo (2012) stated integrating ethnic in the development of teaching materials students are expected to be able to seek information and translate fundamental community science (culture) into science so that students can achieve meaningful experiences. Madura Island is an island known as salt production even to the so-called Pulau Garam (Salt Island). Therefore the knowledge of the production of seawater into salt is one of the cultures possessed by Madurese people who have developed from generation to generation. The salt production process carried out by salt farmers in Madura can be used as a source of science learning (Hadi & Ahied, 2017) That original science salt production contains values that are full of Madura local wisdom.

## METHODS

The type of research used is research and development. The study carried out is the application of developed teaching materials, namely in the form of salt science IPA magazine. The research sample was students of SMPN 2 Socah Bangkalan, class VII A as an experimental class of 20 students. The design of the research conducted was one shot case study.

Before being applied in a large class, the teaching materials at the preliminary testing in ten students first to find out the readability and response to teaching materials for teaching materials.

Research and development of teaching materials in the form of integrated science magazines on salt themes are carried out in several stages, namely (1) competency analysis; (2) analysis of students; (3) material analysis; (4) formulation of learning objectives; (5) selection of learning strategies; (6) selection of assessment and evaluation; (7) collection of references; (8) manufacture of products; (9) preparation of evaluation instruments; (10) expert validation; (11) trials; (12) evaluation. Data collection techniques conducted with non-test in the form of questionnaires. Data collection methods consist of interviews, questionnaires, and documentation. Data analysis includes validity, reliability. The Validity analysis includes content, language, and compatibility with indicators of learning in the curriculum, analysis of student responses, analysis of readability of teaching materials. In this study it is also used to describe what characters students can develop after receiving learning with teaching materials on salt theme magazines.

## RESULTS AND DISCUSSION

This study was develop the magazine with the ethno-science theme of Madura salt and its implementation in learning to develop students' character. The data obtained in the study included expert feasibility data on the Madura salt theme magazine, the results of the student questionnaire responses and the results of the student's readability questionnaire as well as the results of the questionnaire to find out the characters that could be developed for students. Figure 1, Figure 2, Figure 3, and Figure 4 below are an example of an overview of developed teaching material.



Figure 1. Magazine Cover



Figure 2. The magazine content that is integrated with ethnoscience salt.



Figure 3. Content of integrated science



Figure 4. One of Salt production process in Madura

In the following description presented results of the research

### Feasibility of Magazines

At the analysis stage includes competency analysis, student analysis, and material analysis. Basic competencies used are: subjects of Science KD 3.2, KD 3.3, KD 3.4, KD 3.5, KD 3.10 and social studies subjects KD 3.3. The targeted students were VII-B class students at SMPN 2 Socah Bangkalan. The theme of salt is the material chosen for the development of the science magazine using a webbed type integration model.

The design phase includes the formulation of learning objectives, selection of learning strategies, and selection of assessment and evaluation. The development of the integrated science magazine type webbed based on the ethnoscience approach of the salt theme is small-scale trials, so that the stages of selecting learning strategies and the selection and evaluation stages are not carried out. The formulation of learning objectives is used as a basis for the contents of the magazine. The contents of the magazine contain salt related to Madura culture.

The development phase includes collected references, made products, and compiled evaluation instruments. References used journals, books, e-books and personal documentation. Integrated science magazine is made with attractive appearance and language that is easily understood by students so students are interested in reading the magazine. The evaluation instrument used in the development of this webbed -based Integrated Science Magazine is the expert validation sheet of experts (media experts, material experts, and junior high school science teachers) readability questionnaires and student response questionnaires. Examples of Integrated science magazines, webbed type based on ethnoscience, salt theme can be seen in figure 3. The implementation phase includes expert validation, and small-scale product testing. Validation was carried out by media experts, material experts, and junior high school science teachers. The magazine trial was carried out by giving students of the science magazine a webbed type based on salt ethnics to read.

The subjects of the trial were 10 students. The evaluation phase consists of summative evaluation and formative evaluation. Formative evaluation is carried out at each stage of development, while summative evaluation is carried out at the end of the program. Summative evaluation was carried out to determine the readability and response of students to the ethnics-based type webbed magazine with a questionnaire after reading the magazine. The following is an explanation of the feasibility of the magazine through material and media assessment.

#### Assesment of Content Aspect

Calculation of the validation of the feasibility of a Integrated science magazine theme salt based on Ethnosains approach. The results of the assessment of content aspects in the magazine are presented in table 1.

**Table 1.** Result of validation by expert on the content.

No.	Indicator	Validation (%)	Criteria	Reliability (%)	Criteria
1	spiritual	75%	very valid	98%	reliable
2	social	75%	very valid	98%	reliable
3	knowledge	88.54%	very valid	91.66%	reliable
4	skill	77.5%	very valid	97.14%	reliable
	presentation	87.5%		91.43%	reliable
5	technique		very valid		
	presentation	75%		95%	reliable
6	support		very valid		
	teaching	87.5%		85.71%	reliable
7	component		very valid		
	presentation	95%		98%	reliable
8	component		very valid		
	ethnoscience	98%		96%	
9	oriented		very valid		reliable

Based on the results of the content assessment analysis on the validity of the theme magazine. the results showed that the material validity obtained a percentage of 85.79% with a decent category used without revision, reliability was 96.22% with a very high reliability category. These results indicate that the Salt magazine theme is worthy of being used as teaching material for class VII.

The material feasibility aspect consists of nine indicators. The first indicator is the dimension of spiritual attitude. Material experts provide an assessment percentage of 75% and a junior high school science teacher at 75%. The same percentage

shows that the dimensions of the spiritual attitude in the magazine are quite deep. Applying the dimension of spiritual attitude in learning is a form of direct experience. The salt theme magazine contains the dimensions of the spiritual attitude in the form of an invitation to live and practice the religious teachings adopted by students. Arsyad (2013) states that students will gain more experience if learning is much through direct experience. Therefore, magazine theme salt will make students gain more experience.

The second indicator is the dimension of social attitudes. Material experts and junior high

school science teachers gave the same percentage percentage of 75%. This shows that the two experts gave good criteria. The social attitude dimension in the magazine invites students to solve social and global issues such as salt import activities in Indonesia. One way to do this is to understand the tradition of making Madura salt through a magazine based on ethnoscience. Sudarmin (2014) states that ethnosciences-based learning aims to find out the symptoms of material that are considered important by citizens of a culture and to find out how they organize these symptoms in a community's original knowledge system. Based on this, students will be able to solve social problems after reading a salt theme magazine, because the salt theme magazine contains the dimensions of social attitudes to invite students to overcome the problems surrounding the import of salt. Salt imports are related to social studies sub-chapter on the interaction of living things with the economic environment. (add discussion). Environmental based learning can increase students' awareness of biodiversity based on local wisdom (Leksono, A. Syachrurroji, & Marianingsih, 2015)

The third indicator is the knowledge dimension. Material experts gave an assessment percentage of 95.84% and SMP Science teachers at 81.25%. This shows that the two experts gave a percentage of assessment with good criteria. The knowledge dimension in the salt theme magazine invites students to build their own knowledge obtained from the rubrics in the magazine. Learning is more directed at the formation of meanings in students of subject matter that is learned based on students' knowledge and understanding (Suyono & Hariyanto, 2014). Based on this, students will build knowledge because salt magazines can relate the knowledge that has been gained with Madura culture, namely making salt.

The fourth indicator is the skill dimension. content experts provide an assessment percentage of 75% and a junior high school science teacher at 80%. This shows that the two experts gave a percentage of assessment with good criteria. The skill dimensions in the theme magazine are shown in the 5M activities and innovations in salt waste treatment. Utilizing salt waste can make students learn entrepreneurship. While the 5M activity invites students to create, reason, try, ask and reason to solve problems around salt in the surrounding environment.. The result of learning is to produce experiences that originate from the student environment where students not only respond but students also involve themselves. Based

on this, students will get a learning experience after reading the salt magazine because the magazine makes students involve themselves in learning related to the surrounding environment

The fifth indicator is presentation techniques. Material experts provide an assessment percentage of 85% and a junior high school science teacher at 90%. The sixth indicator is supporting the presentation of material. On supporting indicators for material presentation, material experts and junior high school science teachers gave the same percentage percentage of 75%. The seventh indicator is the presentation of learning. In the indicators of learning presentation, material experts gave an assessment percentage of 75% and a junior high school science teacher at 100%. Then the eighth indicator is the completeness of the presentation. On the indicators of completeness of presentation, material experts gave a percentage of 95% and junior high school social studies teachers at 95%.

Salt magazines are made to follow a number of techniques to produce good products. (Andi Prastowo, 2015) there are eight steps that need to be considered in the preparation of teaching materials for magazine, namely curriculum analysis, determining the title of magazine, designing outlines, collecting references, adjusting sentences according to the reader, evaluating or editing writing results, improving writing to stand out, and provide illustrations of tables, images, diagrams proportionally. Based on this, eight steps of the magazine design (design) have been carried out despite revisions to the development stage because there are suggestions for improvement from the supervisor. So that in the stage of implementation (implementation) to be exact in the validation test, magazine gets good assessment criteria on the indicators of presentation techniques, supporting the presentation of material, presentation of learning, and completeness of indicators. Therefore the magazine products that are produced make students impressed and provide special knowledge about salt culture in Madura.

In the indicators of learning presentation there is a special assessment of the integration of material in a learning. Integrated science is science learning that is taught in an integrated or comprehensive manner (Trisnawati, Utami & Widiyatmoko, 2013). The way the teacher in



packaging integrated science learning is very influential on the meaningfulness of science learning for students. Based on this, because the presentation of learning in magazine has been integrated will make students gain a meaningful learning experience after reading the magazine.

The magazine was developed using a webbed type to package material integration. The Ministry of National Education curriculum the characteristics of Integrated Science type webbed began with determining the theme, then developing sub-themes by paying attention to the relation with other fields of study such as social studies subjects. The choice of theme is very decisive in the success of learning. Based on this, the creation of this magazine uses the theme of salt to package cohesiveness between science and social studies. The salt theme was chosen because it is an example of Madurese culture that is very important for students to know.

Orientation indicators for ethnosains. Material experts and junior high school science teachers gave the same percentage is 98%. The results of the assessment indicate that this indicator has very good criteria. The ethnoscience of magazine is shown by the ethnosains rubric which discusses Madurese knowledge about the salt-making process and its relation to science itself. (Rosyidah *et al.*, 2013) ethnoscience allows students to search for information and translate indigenous science into scientific science, so students can achieve meaningful learning. Based on this, after reading the magazine, it will make student learning more meaningful and not boring because the magazine is associated with the culture of making salt in Madura. Thus, the content on the magazine based Ethnosains approach Salt Theme is suggested of use.



**Figure 5.** Ethnoscience's column.

#### Assesment of presentation Aspect.

The results of the assessment of media aspects in the Integrated science magazine based on Ethnosains approach theme Salt are presented in table 2.

Based on the results of the media assessment analysis of the validity of the magazine,

the results obtained that the material validity got a percentage of 91.76% with a decent category used without revision, reliability was 95.08% with a very high reliability category. These results indicate that from the media aspect magazine is worthy of being used as teaching material for class VIII

**Table 2.**Result of validation by expert on the presentation.

No.	Indicator	Validation (%)	criteria	reliability (%)	criteria
1	the magazine size	95%	very valid	98%	reliable
2	cover design	85.41%	very valid	92.85%	reliable
3	content design	85.83%	very valid	92.38%	reliable



The feasibility of the media aspect consists of three indicators. The first indicator is the size of the magazine. In this indicator, media experts and junior high school science teachers provide the same percentage is 95%. This shows that this indicator gets very good assessment criteria. This magazine is printed in A4 size (210 x 297 mm). A4 size is chosen so that the text and images in the magazine can be read well by students. According to National Education Standart (BSNP) the size of good teaching materials must be in accordance with ISO standards. There are two size options for printing teaching materials, namely A4 (210 x 297 mm) or B5 (176 x 250 mm). Based on this, the size of the magazine is stated to be in accordance with ISO standards because the theme salt magazine is printed with A4 size (210 x 297 mm) so as to produce excellent graphic quality.

The second indicator is the magazine cover design. In this indicator, media experts gave an assessment percentage of 84.72% and Junior High School Science teachers at 86.11%. The average validity of the two experts is 85.41% with appropriate assessment criteria used without revision. The third indicator is the design of magazine content. In this indicator, media experts gave an evaluation percentage of 84.17% and Junior High School science teachers at 87.5%. The average validity of the two experts is 85.83% with appropriate assessment criteria used without revision. The Magazine is designed with the appearance of colorful texts and images to attract students' attention and not bore when reading magazine. According to (Nurjanah & Rahardjo, 2014) science magazine is a medium that is used as a tool to understand the concept of science material and can attract students so that science learning is more fun. Magazine is compiled by displaying interesting images so that it attracts students' attention to read. Based on this, students will feel happy when reading the magazine because salt magazines will not make students feel bored.

#### **The implementation of the salt theme magazine on the character of students.**

The character values of students who can be developed from the process of making salt are, working hard, responsibility and cooperation. The results are shown in Table 3

**Table 3.** Result of the character from the salt production processes

Attribute	Characters
Salt Farmers	Diligent and independent
	Working hard to support the family
	Not easily give up
	Discipline, independence and responsibility
	Creative and innovative
	Presevering in preserving the production of salt production process which is an ancestral heritage

The criteria of assessment used to assess the national characters in this study had the score range of 0 – 5 from appropriate/suitable (4.00) to very appropriate/very suitable (5.00).

**Table 4.** Result of the student's character from the salt farmers (n=30)

Character Aspect	Mean
Working hard	4.75
Cooperation	4.50
Responsibility	4.35

Based on the result of data analysis. it was found that the methods that can be developed for working hard (mean=4.75), cooperation (mean=4.50) and responsibility (4.35). Hard work is to strive diligently or sincerely to achieve success and do not know despair. the characteristics of hard work are: diligent and tenacious, thorough and meticulously respect the time and work hard, work smart, discipline, patient, sincere, and never give up. Hard work can be developed with examples and psychological involvement (Handayani & sumaryati, 2014), integration in the learning process (Marzuki & Hakim, 2019). In addition to cooperation and responsibility must also be embedded in learning activities through the provision of examples of activities carried out by salt farmers.

## CONCLUSION

Considerable class learning tested the Magazine based ethnoscience which the salt theme suggested tested in The development of other ethnoscience based teaching materials in future research.

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