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The Need Analysis of PjBL Model Science E-Book Based Indigenous Knowledge on Process of Making Ulos Woven Cloth

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Abstract: The need and availability of digital open materials such as e-books that contain original knowledge are very necessary in science learning, in order to create contextual learning. The basis for the need for e-books containing indigenous knowledge is the existence of various problems that occur in science learning. Some of the problems with science learning include, students still think it is difficult, science learning is irrelevant, uninteresting and monotonous, student's comprehension ability is lacking and non-contextual science learning. This research aims to find out what needs teachers and students want so that science learning can be more innovative. This research uses descriptive qualitative methods. The instruments used were interview guides, questionnaire sheets and science literacy tests. Data collection carried out in this research was interviews, questionnaires and scientific literacy tests. The sample involved in this research was 1 teacher and 53 students using a cluster random sampling technical.

Keywords: Indigenous knowledge; Need analysis; Project based learning model; Science e-book; Ulos woven fabric

Introduction

Indonesia is blessed with a variety of abundant cultural heritage from various tribes and traditions. Ulos woven cloth is one of the cultural heritages of the Indonesian people that we must protect. Ulos is a woven cloth or shawl that functions as a symbol of the Batak people and has a special philosophical meaning (Niessen, 2009). Not only in terms of its cultural significance, but ulos woven cloth also has indigenous knowledge of the manufacturing process which we must protect (Abdillah & Irwansyah, 2019). Indigenous knowledge is knowledge that is owned and adhered to by a community group (Zidny et al., 2020). According to another view, indigenous knowledge is a collection of traditional knowledge and beliefs that develop through a process of adaptation and cultural transfer, the scope of which includes the relationship between humans and their environment (Grenier, 1998; Son et al., 2019).

According Ahmadi et al. (2017) the amount of indigenous knowledge on Indonesia becomes a big problem when the government does not innovate and develop it in learning in schools. This statement was answered directly by the government by establishing Government Regulation No. 19 of 2005 concerning National Education Standards Chapter 14 paragraph 1 which states that the curriculum for SMP/MTs/SMPLB or other forms can include education containing local excellence in every learning (Peraturan Pemerintah No. 19 Tahun, 2005). One learning that can include indigenous knowledge is science.

Science learning is learning related to natural phenomena and everyday human life (Pratama et al., 2022). Science learning emphasizes providing direct, contextual experience so that it can increase students' understanding of the natural world around them (Chan, 2017; Ragil et al., 2022; Childs et al., 2015). However, in reality science learning has not been implemented contextually (Maksić & Spasenović, 2018). This is what makes students think that learning science is difficult, not attractive and irrelevant (Holbrook, 2005; Stuckey et al., 2013). One way to implement contextual science

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learning is to include indigenous knowledge of the community in the learning process (Zidny et al., 2021). This is in line with opinion (Siegel, 2001) that science learning contains the indigenous knowledge of local communities can increase students' interest in learning science because it is related to their daily lives, apart from that it also provides students with insight into the values contained in a community group.

According Chiappetta et al. (2010) that "*science is the study of nature in an attempt to understand it and to form an organized body of knowledge that has predictive power and application in society*". In essence, science learning cannot be separated from three dimensions, namely process, product and attitude (Aisah, 2020). To fulfill these three dimensions, science learning must be carried out using an appropriate learning model. One learning model that can accommodate the achievement of these three dimensions is PjBL (Project Based Learning).

The PjBL learning model is a learning model that emphasizes students on the process of completing projects related to daily life with the aim of increasing students' creativity, collaboration and problem solving. (Chu et al., 2017; Lipson et al., 2007). This PjBL learning model can be linked to indigenous knowledge in science learning. This is consistent with studies carried out by (Zahroh et al., 2022) that science learning using the PjBL model in collaboration with indigenous knowledge of local communities is effective in increasing scientific literacy and fostering student creativity. Success in science learning in the classroom cannot be separated from its components, one of which is teaching materials.

Teaching materials are one of the learning support components that contain learning materials from various sources so that they can help teachers and students in implementing learning (Widodo et al., 2019; Tomlinson, 2011). Teaching materials have some types. Teaching materials that are appropriate to current developments are digital-based teaching materials. This in accordance with opinion Yoga (2019) that since using technology has become essential for humanity, its development is happening very quickly. Therefore, the use of digital teaching materials is a choice of teaching materials that are in line with current developments. One type of digital-based teaching material is e-book. e-Book are learning resources in the form of book packaged digitally which are equipped with interactive features such as animation, music and videos so that they can increase students' interest in learning (Roskos et al., 2017).

Based on the description above, this research aims to find out what needs teachers and students want so that science learning can be more innovative. This analytical study is very important to carry out as an initial basis for producing a PjBL model science e-book development product containing indigenous knowledge on the process of making good ulos woven cloth.

Method

The method used in this research is qualitative. The data analysis technical used is qualitative descriptive analysis, by exploring and analyzing students' needs as an initial stage in developing a PjBL model science e-book containing indigenous knowledge in the process of making ulos woven cloth. The flow carried out in this research is learning problem analysis, product needs analysis, scientific literacy analysis, cultural caring attitude analysis, curriculum analysis and learning content analysis. The data collection technical used were in depth interviews with teachers and distribution of questionnaires and were also reinforced with scientific literacy test instruments.

The research was conducted in July 2023 in one of the junior high schools in Langkat Regency, North Sumatra. The amount of student samples used in this research was 53 people from two classes using a cluster random sampling technique and for interviews the researcher used 1 sample of a teacher at the school.

The interview guide and questionnaire sheet can be seen in Tables 1 and 2. The scientific literacy question instrument used in this research was taken from the 2018 PISA test, totaling 10 questions. Researchers also carry out curriculum analysis and material analysis.

Table 1. Interview Guidelines

Indicator	Number of Question Items
Curriculum	1, 2
Problems in Learning	3, 4, 5, 6, 7, 8, 9, 10
Learning Model	11, 12, 13, 14, 15
Learning Contains Indigenous Knowledge	16, 17, 18, 19,
Teaching Materials	20, 21, 22, 23, 24, 25, 26
Scientific Literacy	27, 28
Cultural Attitude	29, 30, 31

Table 2. Student Needs Analysis Questionnaire

Indicator	Number of Question Items
Learning Problems	1, 2, 3, 4, 5, 6.,7
Product Requirements	8, 9, 10, 11, 12, 13, 14, 15, 16, 17
Scientific Literacy	18, 19
Cultural Attitude	20, 21, 22, 23, 24, 25, 26, 27

Result and Discussion

Analysis of Learning Problems

At this analysis stage the researcher makes observations or investigations related to the problems and obstacles experienced in science learning in the classroom. The data obtained from the analysis of learning problems was from interviews with science

teachers and filling out questionnaires by 53 students. Based on the results of triangulation of data from interviews conducted, the learning problems experienced by teachers in the classroom are the lack or slowness of students in understanding the science material being taught. The teacher said that some students had difficulty understanding science material so the teacher repeated or explained the material too often. The teacher also said that students use gadgets more often than reading book.

Based on the distribution of questionnaires to students regarding aspects of learning problems, the third question is students' perceptions of science subjects, which can be seen in Figure 1.

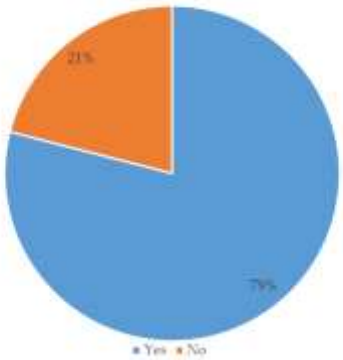

Figure 1. Student assessment of science learning

Based on analysis of the distribution of questionnaires on aspects of learning problems. According to the third question, most students who responded to the survey felt that studying science was a challenging topic; only few students said that studying science was not a challenging subject. Apart from that, if you look at the results of the analysis in the second question, it is related to whether students are happy or not in taking science lessons. The results of the analysis on the second question stated that 58% of students were not happy taking science lessons and only 42% of students answered that they were happy taking science lessons. This is because students have difficulty understanding science lessons and also learning resources that are not interesting and relevant. Based on the sixth question regarding the attractiveness of the textbook teaching materials used, from the analysis results, only 23% of students answered interesting and 77% of students answered not interesting.

Product Needs Analysis

At the product needs analysis stage, we will explore the use of teaching materials, as well as how the learning process takes place, whether it uses learning that integrates indigenous knowledge/local wisdom or not. In the product needs analysis, data was obtained from interviews with teachers and filling out questionnaires. Based on the results of triangulation of interview data related to the learning process, it was found that teachers had never implemented science learning that was integrated with local culture or indigenous knowledge such as ulos woven cloth or Indonesian culture in general. The teacher said that the learning process was still carried out as usual, but it was not uncommon for teachers to often link learning with the surrounding environment.

Apart from that, regarding the learning model applied by teachers in classroom learning, they still use conventional learning models such as lectures. Teachers have never implemented other learning models such as PjBL or project based learning. On the other hand, teachers are aware of the existence of the PjBL model but its implementation has not yet been implemented. In terms of teaching materials used, based on interview results, teachers have never used digital-based teaching materials such as e-book, e-modules or other digital teaching materials. The teacher also said that he had never used teaching materials based on culture or indigenous knowledge from the local community. The teaching materials usually used are textbooks from the Kemendikbud. The teacher conveys that he agrees that learning uses digital teaching materials based on indigenous culture or knowledge.

Based on the results of the student questionnaire analysis on aspects of product needs seen from the learning process, the eighth question is whether students have ever been asked to work on a project in science learning in class. The results of the analysis show that all students answered that they had never worked on a project. This is because teachers have never implemented a project-based learning model in learning science in class. However, if you look at the results of the questionnaire analysis on question ten, regarding students' perceptions of their enjoyment if asked to work on a project, it can be seen in Figure 2.

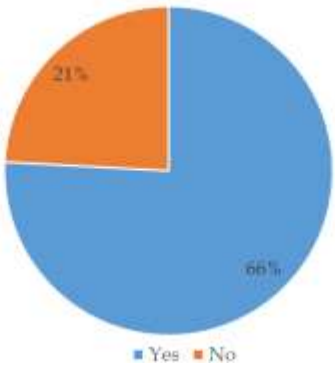

Figure 2. Student's enthusiasm for project-based learning

Based on this analysis, the majority of students answered yes, which means happy, and only a few

students answered no or not happy. The results of this analysis are in accordance with research conducted by (Krajcik & Shin, 2014) that by implementing project-based learning through the PjBL model, students will be more active and more interested in participating in class learning. Another view of the analysis of the learning process is the continuity of science learning which is integrated with the indigenous knowledge of local communities or culture.

Based on the results of the questionnaire analysis on question eleven regarding whether learning has ever been linked to the culture or indigenous knowledge of the local community. The results of the analysis show that all students answered no, which means that science learning has never been integrated into the culture or native knowledge of the community. However, if we look at question thirteen, regarding students' enthusiasm if learning is implemented that integrates indigenous knowledge of local communities or local culture, it can be seen in Figure 3.

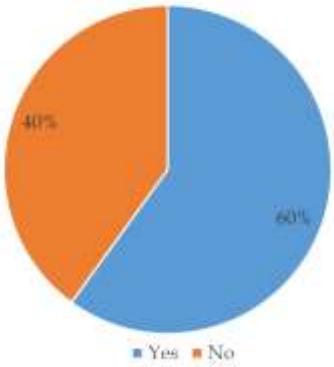

Figure 3. Students' enthusiasm for integrated learning with indigenous knowledge of local communities

From the results of the analysis in Figure 3, the majority of students are enthusiastic and agree that science learning is integrated with the original knowledge of local communities or culture. Apart from that, from the questionnaire analysis, 92% of students thought that if science learning was implemented which was integrated with culture, it would be interesting, and only 8% thought it would not be interesting. This is in accordance with research conducted by Sumarni et al. (2016) according to him, science learning that is integrated with the original knowledge of local communities will create meaningful learning, besides that students will be more interested in learning because learning is connected to things that are close to them.

Analysis of the distribution of questionnaires on the next aspect of product needs is seen from the perspective of the use of teaching materials. From the results of the questionnaire analysis on the product needs aspect, if we look at question sixteen regarding whether students have ever used e-books as teaching materials in class. The results of the analysis show that 89% of students have never used e-books as teaching materials and 11% of students have never used e-book as teaching materials. However, if we look at the enthusiasm of students regarding the use of digital e-book teaching materials in science learning, question seventeen can be seen in Figure 4.

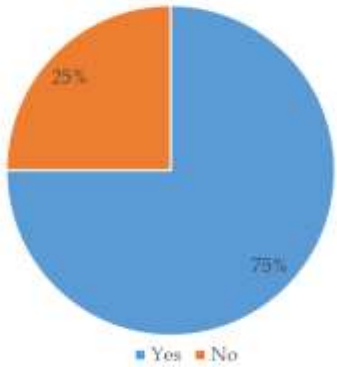

Figure 4. Students' enthusiasm for using e-book teaching materials

Based on the results of the analysis in Figure 4, it shows that the majority of students are enthusiastic and agree that science learning uses e-book teaching materials. Learning using digital teaching materials such as e-book or similar, which can be accessed from electronic devices such as smartphones or laptops is very popular with students. This is also in line with opinion (Roskos et al., 2017) that learning using e-books can provide new experiences for students, besides that it can increase students' interest in learning because e-books are equipped with interesting features.

Science Literacy Analysis

At the scientific literacy analysis stage, researchers obtained data from interviews and the results of scientific literacy tests on 53 students. The scientific literacy test questions are taken from the 2018 PISA test, totaling 10 questions. This scientific literacy test was carried out by researchers to determine the extent of students' ability to connect the science concepts they learn with their daily lives. Scientific literacy is a person's ability to understand science broadly and develops with the times (DeBoer, 2000). Based on the results of triangulation of data from interviews with teachers regarding the increasing students' scientific literacy, namely that in learning teachers often link science concepts with things that are close to students' daily lives. Meanwhile, the results of the scientific literacy test can be seen in Table 3.

Table 3. Results of Scientific Literacy Values at Research Locations

Score	The Amount of Student
0	1 Student
10	6 Student
20	12 Student
30	8 Student
40	11 Student
50	7 Student
60	8 Student

Based on the score data in table 3, it shows that the scientific literacy results of students at the research location junior high school are very low. Through these results, researchers plan to increase students' scientific literacy. This is in accordance with the aim of science learning, namely increasing scientific literacy (Laugksch, 2000). Good implementation of science learning is learning that facilitates students in mastering scientific literacy (Chiang & Tzou, 2018). Scientific literacy is important because it is a parameter in determining development capabilities through education in the context of science learning (Bröder et al., 2017).

Analysis of Cultural Concern Attitudes

At the analysis stage of cultural caring attitudes, data was obtained through interviews with teachers and student questionnaires on aspects of cultural caring attitudes. Based on the results of triangulation of interview data with teachers, it is stated that students understand and recognize the cultures around them. The teacher also stated that he did not really understand how students care about their culture when viewed from science learning.

Based on the results of the student questionnaire on aspects of cultural caring attitudes related to students understanding of ulos woven fabric, it can be seen in Figure 5.

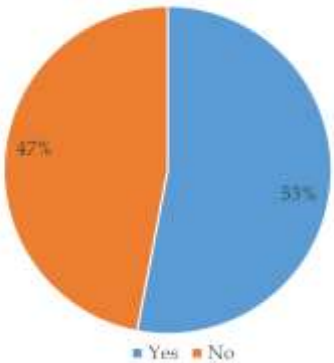

Figure 5. Students' introduction to ulos woven fabric

From the results of the analysis in the picture, it shows that the majority of students know and understand ulos woven fabric. However, in the twenty-second questionnaire question regarding students' knowledge of making ulos woven cloth, the results of the analysis showed that 85% of students did not know how to make ulos woven cloth. Meanwhile, 15% of students know the process of making ulos woven cloth. Judging from the results of the analysis of the twenty-fifth question regarding students' love of their culture, it can be seen from Figure 6.

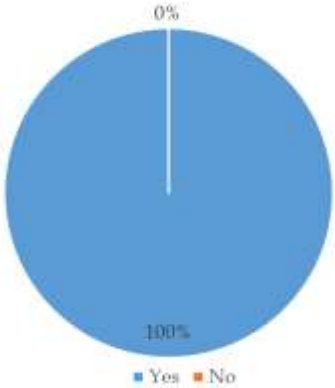

Figure 6. Students' love of culture

Based on the results of the analysis in Figure 6, it shows that all students love their culture. These results are the basis for researchers in continuing research to develop natural science products based on original knowledge of ulos woven cloth, because if seen from the results, the majority of students know and are familiar with ulos woven cloth, but they do not know how to make it.

Curriculum and content analysis

After getting an overview of the development of PjBL model science e-book products containing indigenous knowledge in the process of making ulos woven cloth, the researcher continued on to the next stage of analysis, namely curriculum analysis and material analysis. This analysis aims to find out what competencies and phases students must have in learning science using e-book products. The results of this analysis will also become a reference in the development of e-book products that will be implemented.

Researchers also analyze what science content or material will be contained in the science e-book that will be developed. The content contained is based on class VII material and can be integrated with the process of making ulos woven fabric. Material analysis was carried out based on the syllabus and relevant science book sources, such as science textbooks commonly used in class. The results of the curriculum and material analysis can be seen in Table 4.

Table 4. Curriculum Analysis and Material Analysis

Independent Curriculum		
Element	Learning Achievements	Subject matter
Understanding of Science	At the end of phase D, students are able to classify substances based on their observed forms, identify the properties and characteristics of substances, differentiate between physical and chemical changes and separate simple mixtures. Students are able to measure the physical aspects they encounter and understand and utilize various movements and forces, measure the temperature caused by the heat energy provided, as well as be able to differentiate insulators and heat conductors.	Substance and their changes Element, compound, mixture Heat
Process Skills		

The PjBL model science e-book product contains indigenous knowledge on the process of making ulos woven fabric which will be developed using a connected integration model (Fogarty, 1991). The material that will be combined is as written in Table 4.

Conclusion

Through analysis of learning problems, researchers found that science learning is still taught non-contextually. Through product needs analysis, scientific literacy analysis and cultural caring attitudes, researchers found that learning still uses conventional learning models, science learning has not integrated with the original knowledge of local communities or culture. Apart from that, the problems that exist are the use of teaching materials that still utilize science textbooks, and the creation of learning that facilitates the development of students' scientific literacy. Based on the existence of these problems and the analysis carried out, it can be recommended to develop PjBL Model science e-book teaching materials containing Indigenous Knowledge on the process of making ulos woven cloth which contains the main material of substances and their changes, elements, compounds and mixtures as well as heat.

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Author Contributions
D.H.P: Preparation of original manuscript, introduction, methodology, analysis, results, discussion, conclusions; M.M: Analysis-Review; S.S: Review.

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Conflicts of Interest
There are no conflicts or interests.

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