
The Need Analysis of Ethno-Integrated Science Book Based on Pacu Jalur in Kuantan Singingi

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Abstract. Currently science learning has several problems including the lack of contextual material discussed, thus making science learning considered less interesting, monotonous, and difficult. This study aims to analyze the need for science learning contents used in schools to solve those problem. The research method used is a qualitative type of survey research. Data collection techniques were carried out through interviews with science teachers, student questionnaires, scientific literacy tests, and observations. The number of samples was 3 teachers and 47 students through cluster random sampling. The instruments used in this study included interview guidelines, questionnaires, learning observation sheets, and scientific literacy tests. Data analysis in this study used descriptive qualitative. Based on this needs analysis, the results obtained recommend the development of integrated science textbooks containing cultural content on the Pacu Jalur Kuantan Singingi, to be able to increase scientific literacy and cultural concern of students.

Keywords: Ethno-Integrated Science, Pacu Jalur Kuantan Singingi, Qualitative Research, Need Analysis

Introduction

History records that the background to the emergence of science was due to human needs in life to solve everyday problems, so that this need prompted the birth of science as one of the general subjects in educational units to date (Widiyatmoko & Wiyanto, 2016). Science learning is a learning related to how to find out about natural phenomena systematically and has a close relationship with human life (Rahmiwati et al., 2018; Sarmi et al., 2019; Widiyatmoko & Wiyanto, 2016; Wilujeng, 2019). Natural science is essentially not only considered as mastery of a collection of knowledge in the form of facts, laws, and theories, but also a process of discovery which is expected to be a facility for students to learn about themselves, the natural environment, as well as prospects for further development in applying it in life (Handayani et al., 2018a, 2018b; Rimalolas et al., 2021; Wilujeng, 2019). The implementation of science subjects in schools is also part of the education system which is directed at being able to practice something based on the needs of students, so that it can assist them in gaining deeper, more meaningful experience, and understanding of the natural world around them scientifically (Dewi et al., 2017; Wilujeng, 2019).

Science learning in SMP/MTs currently carries several changes. One of the changes in this decade is the effort to strengthen the competency and achievements of students through the 2013 curriculum. Science learning in SMP/MTs, which was previously taught separately between scientific sub-discipline studies, has begun to be developed into an integration (Sarmi et al., 2019; Widiyatmoko & Wiyanto, 2016). Integrated science is a form of implementation of the essence of 21st century learning that packages holistically in each of its interdisciplines, such as physics, biology, chemistry, earth-space sciences, etc. (Asrizal et al., 2018; Mubita & Kalimaposo, 2016; Novitasari et al., 2017; Rinto et al., 2020; Wilujeng, 2019).

Integrated science has a broader meaning than previously known "IPA terpadu". Integrated science basically includes integration between science disciplines or integration of content, skills, attitudes, character, and even local potential with 3 main characteristics covering the dimensions of attitude, process, and product (Gusnedi et al., 2018; Rahmiwati et al., 2018; Wilujeng, 2019). This integration is expected to be able to create collaborative learning thematically and contextually, provides opportunities for students to learn and relate relevant science issues to their life, to get hands-on experience and apply science concepts that they are trying to find authentically and meaningfully through relationships between various concepts with one another without any gaps or overlapping between sub-disciplines (Asrizal et al., 2018; Rahmiwati et al., 2018; Widiyatmoko & Wiyanto, 2016; Yusnitasari & Isnaeni, 2019). The another goals and benefits of integrated science are also being able to train students to have the ability to solve problems, master the skills in the science field and social-spiritual abilities in a holistic, comprehensive manner, and be able to facilitate each of these skills effectively and efficiently (Gusnedi et al., 2018; Rahmiwati et al., 2018; Wilujeng, 2019).

The theory and expectations above have not been able to run smoothly. The Facts show that science learning that has been attempted so far has not been able to run well and maximally in junior high schools. One of these problems is caused by natural science material which should be packaged in an integrated based on the curriculum, but is still presented fragmented. Because of that, the essence of integration and linkage between natural science material doesn't appear in learning (Asrizal et al., 2018). This polemic also gave rise to a new round of problems, like monotonous learning and less attractive to students (Anderhag et al., 2016).

The stigma of the lack of interest in science cannot be separated from how learning has been taught. One of the reasons is that the science lessons taught are not accompanied by relevance and correlation to the relationship between the material being taught and the experiences and lives of students. The result of these problems is that students feel their learning is less interest, not contextual, and unmeaningful (Asrizal et al., 2018; Childs et al., 2015). This is coupled with the dominance of the western science paradigm which is still quite strong in many science learning resources in Indonesia, so that not many natural science learning resources are studied by students in accordance with the culture of life they experience (Ideland, 2018; Khaddour et al., 2017; Matsun et al., 2019).

As a source of learning, teaching materials are considered very important in becoming part of a learning process. Learning contents are defined as an essential tool needed by teachers to help and facilitate learning logically and systematically to increase the knowledge, competence, and abilities of students (Asrizal et al., 2018; Olayinka, 2016). Learning content specifically function to facilitate students in learning the content being taught, accommodate and become the main source of learning, provide specific ideas that are developed scientifically, and improve cognitive, affective, and psychomotor abilities (Asrizal et al., 2018; Yenni et al., 2017). The role of learning content must be

maximized in the learning process (Olayinka, 2016; Saad, 2017). Giving a proportional portion of learning content also needs to be considered, because it will affect the mastery of knowledge, skills, even the development of confidence, and self-actualization of students in learning (Jejelelah et al., 2016; Saad, 2017).

One of the most common and popular learning tool and commonly used in science learning in SMP/MTs so far is textbooks. Textbooks are defined as printed learning resources that become a guide for students in supporting the process of learning activities. The existence of textbooks as the main learning material cannot be separated and replaced even though over time there are always progress and innovation (Handayani et al., 2019; Lestariningsih et al., 2021). Textbooks as the main learning tool in an educational strategy must be a reference that still refers to the curriculum (Kemendikbud, 2014; 2016). Textbooks are used to achieve basic competencies and increase the efficiency and effectiveness of student needs as determined by Ministry of Education (Kemendikbud, 2016; Rahmiwati et al., 2018). The role of textbooks in a lesson is expected to be able to bridge the teacher as a facilitator to invite students to gain knowledge and concepts in an applicable manner. Textbook also has function to facilitate students to explore and explore their various abilities (Mulyeni et al., 2019; Rumalolas et al., 2021).

Science books as a vital source of learning are still being adapted from western paradigm. Many values from Indonesian local wisdom have not been utilized as teaching references in schools, even though education policy in Indonesia provides opportunities to do it (Dwianto et al., 2017). One of the contributing factors is due to the teacher's obstacles in mastering the contents to develop the needs of science learning based on local wisdom (Ardianti et al., 2019). Based on the description above, this study aims to discuss and found out about what innovative learning science are desired and needed by teachers and students in in schools.

Methods

The method used is a survey qualitative research. The stages of the research include front end, student, curriculum, and learning contents analysis. Researchers collected data at a junior high school in Kuantan Mudik, Kuantan Singingi Regency, Riau in May 2022. The total sample of students was 47 people through cluster random sampling technique. Data collection was carried out through interviews with science teacher, learning observation, questionnaires and PISA scientific literacy tests by students. The data analysis technique used is quantitative descriptive. The results of these data are also strengthened by several relevant literature studies. The interview guide, questionnaires, and observation sheets can be seen in Tables 1, 2, and 3.

Table 1. Interview Guidelines.

Indicators	Number of Question Items
Learning Problems	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,
Characteristics of Learners	14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28,
Product Needs	29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39,

Table 2. Student Interest Questionnaire Grid.

Indicators	Number of Question Items
Learning Problems	1, 2, 3, 4, 5,
Characteristics of Learners	6, 7, 8, 9, 10, 11, 12, 13,14, 15, 16, 17, 18, 19, 20, 21,
Product Needs	22, 23, 24, 25, 26, 27, 28,29, 30, 31, 32, 33, 34, 35, 36

Table 3. Guidelines for Learning Observation Sheets.

Indicators	Number of Assesment Items
Learning Device	1, 2, 3,
Learning Process	4, 5, 6, 7, 8, 9, 10, 11, 12, 13,14, 15, 16,
Student Behavior	17, 18

As for the scientific literacy test instrument used in this study, it adopted the 2018 PISA test with 10 questions. In completing the data requirements for this research, the researchers also conducted an analysis of the curriculum and learning contents on the syllabus and some of the science textbook used. Through the analysis of the curriculum and learning content, it is hoped that it will be possible to map the contents and competency standards required by students in learning.

Results and Discussion

Front End Analysis

At this stage, the researcher conducted an investigation regarding the problems and constraints in learning science. Data collection in this analysis was carried out by conducting interviews with 3 science teachers, learning observation, and filled out questionnaires by 47 students. The first finding is that students consider science learning a difficult subject. This can be seen in Figure 1.

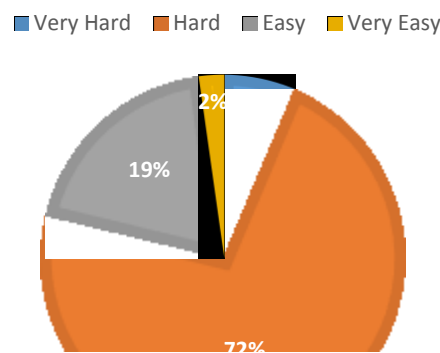


Figure 1. Student Assessment of Science Learning

The majority of students who filled out the questionnaire considered science as a difficult subject, and a small proportion of students considered learning science as an easy subject. There are several reasons that make students think science as difficult subject. This is caused by several difficulties and obstacles faced by students in the learning process, including 91.5% of students assessing science learning being taught is difficult to understand and not contextual and boring. The percentage 8.5% of students also think there is no science learning resources that are interesting and according to their needs. To validate those problem findings, the researcher triangulated the data 594| *Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education)*, 11(3), p.591-607, (2023)

obtained through interviews with science teachers and learning observation. The results show data that is not much different. Students do experience difficulties in understanding the science lessons being taught. This can also be seen when students work on assignments or exercises, inability to answer teacher questions, and liveliness in learning which is still rated low.

If these problems are considered in more detail, they actually have a relationship and influence each other. This is in accordance with research (Olayinka, 2016; Asrizal, et al., 2017; Ulandari et al., 2019) states that the learning resources are important elements that can affect the achievement of learning. Learning content can encourage effectiveness, efficiency, and practicality of learning in a more active. In this case, the lack of interesting and appropriate learning resources and contents made science learning be difficult for students.

Students Analysis

At this stage, researchers will explore the characteristics, abilities, interests, and needs of students. Data collection at this analysis stage was carried out by observation, filled out questionnaires, and tests. In connection with the problems that have been presented in the introduction and also found in the front-end analysis, such as science learnings which is considered less contextual, not relevant, uninteresting, and still dominated by western science. To validate those findings, the researcher conducted a scientific literacy test on students using several selected PISA questions. This test aims to see the extent to which students' abilities can relate the science material they are learning to their lives.

Scientific literacy is the ability that a person reflects reflectively in using his scientific knowledge to identify, interpret, explain, and conclude an issue and belief from a natural phenomenon or daily human activities based on empirical evidence through scientific concepts and facts (Fauziyah et al., 2021; Kade et al., 2019; OECD, 2019; Rostikawati & Permanasari, 2016; Siswanto et al., 2023; Soo-bum & Sei-Hill, 2018; Sukowati & Rusilowati, 2016). Scientific literacy is considered a basic ability that students really need to be able to master and exist in the current era of globalization (Fauziyah et al., 2021; Jufrida et al., 2019; Savitri et al., 2021; Suprianti et al., 2021). Scientific literacy is also a parameter that can determine the human resource development index in the education sector (Amrullah et al., 2021; Bröder et al., 2017; OECD, 2019). Scientific literacy which consists of 3 aspects including aspects of content, context, and competence will direct students to be able to solve and deal with various problems in everyday life (Fauziyah et al., 2021; Kade et al., 2019; Kähler et al., 2020; OECD, 2019).

Good science learning is study that can facilitate students to be able to master scientific literacy (Auerbach & Schussler, 2017). The most crucial part in increasing scientific literacy for students is strengthening the aspects of knowledge and understanding of science, scientific processes, and attitudes. Students are expected not only to know concepts, but also to be able to apply their scientific abilities in solving problems and finding solutions based on scientific considerations (Amrullah et al., 2021; Budiarti & Tanta, 2021; Savitri et al., 2021; Vieira & Tenreiro-Vieira, 2016).

The ideal condition above shows how important scientific literacy skills are for education, but in fact in Indonesia, this ability was still relatively low. Published data from 2005-2018 shows Indonesia is consistently ranked in the 10 lowest. In 2006-2012, Indonesia was only able to rank 64 out of 65, in 2015 it was ranked 62 out of 70, and in 2018 it was ranked 70 out of 78 countries. Of the 3 competency categories tested,

Indonesia's scientific literacy scores always fluctuate and are below average with score ranges of 393, 383, 382, and 403, while in the last survey in 2018 Indonesia was only able to score 396. This fact illustrates that Indonesia's achievements in PISA are still far from the existing standards (Hikmawati et al., 2021; Kemendikbud, 2019; OECD, 2019; Rostikawati & Permanasari, 2016). Seeing the PISA result of Indonesia, the researchers conducted a test of students' scientific literacy in schools as research location. The purpose of this test is to see the results of scientific literacy skills in the school. These results will become a reference and be able to map out what kind of solution. The results of the scientific literacy test can be seen in Table 4.

Table 4. Results of Science Literacy Scores at Research Locations

Scores	Frequencies
0	9 Students
10	29 Students
20	8 Students
30	5 Students
40	1 Student

Based on the score data in Table 2, it shows that the scientific literacy of students in the junior high school research location was conducted was also very low. These results were also reinforced by interviews and observation in learning which showed that students' scientific literacy was same condition. If it is related to the findings of the previous problems, the low scientific literacy of students can be caused by a lack of contextual and meaningful science learning being taught. In connection with learning that is less contextual, science learning that is obtained through teaching resources or contents at school is considered to be less close to students' daily lives.

Several previous studies have provided many solutions to this problem. Experts consider it necessary to have innovation in learning, for example involving socio-cultural elements directly in learning science at schools (Dwianto et al., 2017; Østergaard, 2017; Zinyeka et al., 2016). The socio-cultural aspect is believed to be a part that is very relevant, close, and contains many values in human life (Huaman & Elizabeth, 2016; Wilujeng, 2016). This aspect can be one of the opportunities in strengthening more meaningful and contextually to science learning. This learning style is also expected to increase students' interest and learning achievements as well as the relevance of learning science for students (Setiawan et al., 2017; Zidny et al., 2020).

These social and cultural elements can be represented and referred to in the form of local wisdom that has grown and been rooted for a long time. Efforts to integrate local wisdom with science learning are considered to be able to help reconstruct and increase scientific knowledge through socio-cultural identities that have been attached to their lives (Atmojo et al., 2018; Rohmaan & Mukhibat, 2017). This opportunity can be utilized by the world of education to rebuild and create a learning environment that is close to the lives of Indonesian society, as well as a strategy to always emphasize more meaningful science learning for youth generation (Handayani et al., 2018a; Parmiti et al., 2021; Wilujeng, 2016).

Indonesia as a country that has a variety of cultures is considered to have the potential to be able to apply this learning system. Local cultural wealth that has been passed down from generation to generation will be an asset and a big challenge to be able to carry out the above solutions (Handayani et al., 2019; Parmiti et al., 2021; Zidny et al., 2021). This momentum is also supported by government policies through Statute of National Ministry of Education No. 22 of 2006 which states that local cultural wealth can

be optimally utilized and managed by many parties. The goal is that this wealth has influence and contribution to the world of education, so that it is not just wasted with time (Dwianto et al., 2017; Prest et al., 2021; Setiawan et al., 2017), but also provide a significant impact and a real contribution in developing a close relationship between local wisdom, science, and education which so far were considered to have no correlation with each other (Dwianto et al., 2017; Zidny et al., 2021).

This innovation is also expected to increase the cultural concern of the younger generation. Along with the progress of the times, it is undeniable that the cultural concern is declining. Researchers conducted a survey of students through questionnaires and interviews with science teachers at one of the junior high schools in Kuantan Mudik regarding the cultural concern. The results of the survey and interviews show that, normatively, students do show cultural concern, but the concern are not deeply imbued. Students only know their culture in general and outside, but do not understand it fully and further. When referring to the true definition cultural concern was understood, applied, and developed these cultural values in real life. This concern will lead to responsiveness, care, and responsibility towards the preservation, inheritance, and development of existing cultural values (Eufrasia et al., 2019; Irmania et al., 2021; Parmiti et al., 2021; Purwanti, 2017; Tabi'in, 2017). The results of this study still show the low cultural concern of students in Kuantan Mudik.

Based on the results of the front end and student analysis above, the researcher concludes that teachers and students currently want an innovative teaching material that can be a solution to the various problems previously. The survey results of students through questionnaires and observations which were also reinforced through interviews with science teachers indicated that 91.1% of students stated that they needed to really need innovative learning. This innovation is expected to be different from the previous, more interesting, and can be a solution to improve the quality of learning.

When asked to students, 91.1% of them answered that the type of innovative learning contents wanted at this time were culture-based science textbooks. This culture-based textbook of course have to novelty, effectiveness, and practically. Textbooks are considered as a practical learning resource, don't require other learning tool for use, and can be used by anyone at any time. According to students and teachers, the existence of this culture-based textbook will be able to increase enthusiasm for learning, help students to understand learning better, increase scientific literacy and cultural concern of students. student's perceptions of the need for Textbooks shown in Figure 2.

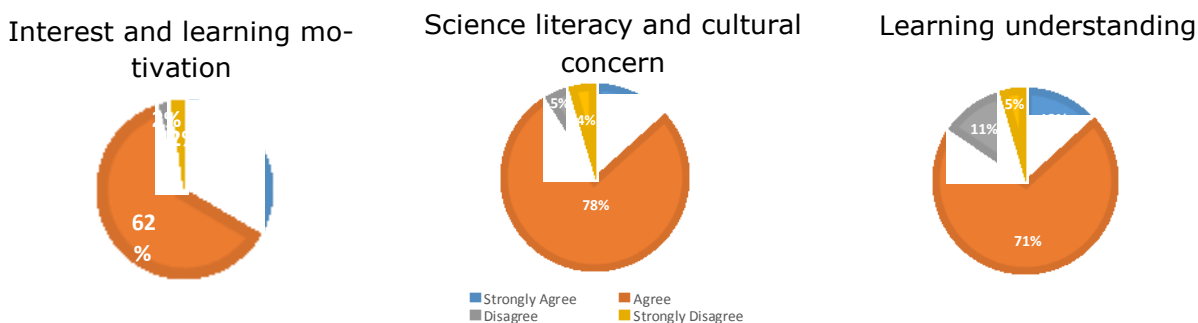


Figure 2. Student's perceptions on the need of Textbooks

This is in accordance with the problems that occur, the low cultural concern of students, in theory it will certainly be resolved through the use of learning contents which are also developed on a culture-based basis. By containing content that is close to life, such as culture, this textbook is expected to increase the relevance and contextuality of learning science. Thus, students' scientific literacy abilities will also be optimized (Sukmawati, 2017). To complete this solution, researchers asked questions through questionnaires which culture was most popular and interested in students. Presented are 3 popular cultural options in the Kuantan Singingi district, especially Kuantan Mudik, namely Pacu Jalur, Perahu Baganduang, and Randai. The results of this poll can be seen in Figure 3.

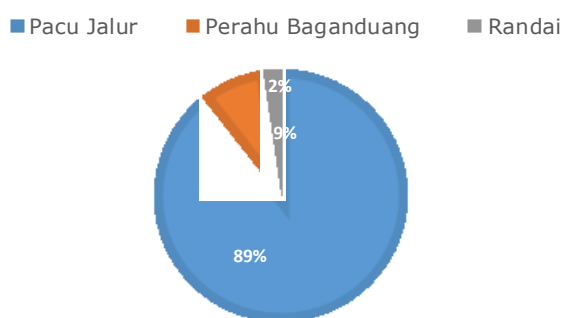


Figure 3. Student's Cultural Interest

Based on the results of the survey in Figure 3, the culture that is most interesting by students to be included in learning content is Pacu Jalur. Pacu Jalur in the Rantau Kuantan Malay language has the meaning of a cultural festival of traditional rowing boat races with a length of 25-40 m and is filled by a total of 40-50 racing athletes on the Kuantan river every year as a commemoration of the great Islamic holidays and the independence of the Republic of Indonesia (Afrison & Masunah, 2021; Febrian & Jumadi, 2022; Firmanyah & Masunah, 2019; Putra, 2019). Pacu Jalur which has become one of the most well-known cultures in Riau and Indonesia is considered to have the potential to be appointed as material for integration with education, because it is considered to have become one of the proud icons of Kuantan Malay cultural hegemony. Pacu Jalur is also a culture that is included in the national tourism calendar every year and always attracts a lot of interest from the people of Riau, national and foreign tourists (Aslati & Silawati, 2017; Febra et al., 2018; Febrian & Jumadi, 2022; Mahardi & Erlisnawati, 2019; Venydhea & Rosaliza, 2020).

Curriculum Analysis

After getting an overview of the product development, the Pacu Jalur culture-based science textbook, the researcher will proceed to the next analysis stage, to analyze the curriculum, especially on the aspects of core, basic, and standart competency. This analysis aims to see what competency outcomes must be possessed by students in learning science. These results will be considered as book reference for product later. Thus, the product developed is expected to be able to facilitate and support student achievements that have been determined by the curriculum.

Based on the analysis that has been carried out, 3 basic competencies were obtained in the revised 2013 curriculum which have the potential to be integrated with

the cultural content of spur lanes. These three basic competencies are in class VIII. The 3 basic competencies can be seen in Table 5.

Table 5. Class VIII Competencies Based on Pathway Culture

3.2 Analyzing straight motion, the effect of force on motion based on Newton's Laws, and its application to the motion of objects and living things.	4.2 Presents the results of the investigation of the effect of force on the motion of objects.
3.3 Explain the concept of work, simple machines, and their application in everyday life including the work of muscles in the human skeletal structure.	4.3 Presenting the results of investigations or solving problems about the benefits of using simple machines in everyday life.
3.8 Explain the pressure of matter and its applications in everyday life, including blood pressure, osmosis, and capillary transport tissue in plants.	4.8 Presenting experimental data to investigate liquid pressure at a certain depth, buoyancy, and capillarity, for example in plant stems.

In supporting product development time efficiency, only basic competencies 3.3 and 4.3 were selected to be developed into book products. This is also based on considering the basic competencies that are most dominantly contained in the cultural content of Pacu Jalur. These basic competencies 3.3 and 4.3 will then be derived and specified again into several indicators of competency achievement. This indicator will be a benchmark for the achievement of students' abilities (cognitive, psychomotor, and effective).

Content Analysis

The researcher then analyzed what content is contained in basic competencies 3.3 and 4.3 which can be integrated with the the Pacu Jalur Kuantan Singingi. Content analysis was carried out on the syllabus and several relevant science learning resources, such as several science textbooks that have been used at school. The results of this analysis are presented in the form of a matrix which will serve as a framework for the development of contents in the book product. The contents analysis matrix can be seen in Table 6.

Table 6. Matrix of Subject

Subject	Physics	Biology	Chemistry	Geology & Astronomy	Health & Safety	Environment	Technology
Work and simple machine in life.	Work Energy Power Simple Machine	Source of energy for humans The principle of a simple machine in a motion system	Chemical energy	-	Safety of Pacu Jalur	-	Tools that apply the principle of a simple machine in Pacu Jalur
Integrate d Model	Webbed (Fogarty, 1991)						

This ethnoscience-based science book based on Pacu Jalur culture will be developed using the Webbed (Fogarty, 1991). The book will be packaged into several learning themes and sub-themes. Each theme and sub-theme will be presented in an integrated manner among the loaded science sub-disciplines. Contents on work and simple machines will be discussed and also be presented with various elements perspectives of Pacu Jalur and Malay Kuantan Singingi. It is expected to be able to enriches students insight, improve their achievement, and learning motivation (Hanum et al., 2023; Zinyeka et al., 2016).

Conclusion

Through the analysis of the front end and students conducted, the researchers found that science learning is currently experiencing several problems. Some of these problems include the lack of innovative learning that are contextual and relevant to students, science learning is still taught in a fragmented, and low scientific literacy and a cultural concern. These findings open up opportunities to integrate elements of local wisdom with science learning. Through curriculum and material analysis, researchers found that the cultural content of Pacu Jalur could potentially be loaded as science learning content and resources. Based on the results of this analysis, it can be recommended to develop an ethnoscience-based integrated science book based on the Pacu Jalur Kuantan Singingi. The development of this textbook is expected to be able to increase scientific literacy and cultural concern of students which are considered to be very low, or other science learning problems, especially in Kuantan Singingi Regency.

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