Local wisdom in Lombok island with the potential of ethnoscience for the development of learning models in junior high school

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Abstract. This study aims to describe local wisdom on the island of Lombok that has the potential for ethnoscience to develop a learning model at Junior High School. This research uses a qualitative approach. The data collection method is done by using observation, interview, documentation, and literature study. The results showed that local wisdom on the island of Lombok that has the potential for ethnoscience is Sasak Sade Village, Bau Nyale Tradition, Sesek Weaving, Gendang Beleq, and Poteng Reket. Sasak Sade Village has a traditional house using certain sizes, namely length (Sedepa), width (Sesata), and height (Sprunjung). The Bau Nyale tradition is the hunting tradition of Nyale (sea worms). Sesek Weaving has various motifs and philosophies, various preparation processes, weaving and finishing processes to traditional waste utilization. Gendang Beleq is a traditional musical instrument made of animal skin and the two sides are closed, when it is hit the sound will bounce off the other side and go through a damping process so the resulting sound will sound smoother. Poteng Reket is a conventional biotechnology product. This local wisdom that has the potential for ethnoscience can be utilized in the development of learning models, especially in science subjects at Junior High School.

1. Introduction
Knowledge can be in the form of perceptions or facts that will be transformed with a very broad scope of ethnoscience, so it is necessary to consider how to reconstruct effective science [1]. How to reconstruct science is related to the daily culture that students have. There are limitations to students' thinking about the efforts of the five groups of students in a community-based ethnoscience approach to underlie the need for developing a science learning model [2] as shown in Figure 1. The five groups of students are Potential Scientist (PS), Other Smart Kid. (OSK), I Don't Know Student (IDKS), Outsider Student (OS), and Inside Outsider (IO).
The five categories of students based on the way they enter the science culture in the classroom from their daily culture can be explained as follows. The first group is called the "Potential Scientist" (PS). Students in this group can easily cross the boundaries of the two cultures, namely the science school culture and their daily culture naturally, as if these boundaries do not exist for them. The second group is called "Other Smart Kids" (OSK), which is a group of students who can cross the line well, but they still perceive and recognize science as a foreign culture. Students in this group mostly like to use "smart" ways to succeed in science learning. They can build science knowledge constructs in their mental schemata and store it in long-term memory which can only be accessed again when needed at the time of the exam. The third group is "I Don't Know Students" (IDKS), which is a group that faces serious problems crossing the boundaries of the two cultures, but is willing to learn to overcome them, and succeeds in using the Fatima's Rule method continuously. but they do not understand the concept of science comprehensively. They tend to memorize concepts, not understand them. The fourth group is "Outsider" (OS), a group of students who tend to be isolated during the process of science learning. This group faces major problems in trying to cross cultural boundaries. It was almost impossible for this group of students to cross the bat the ace. This is due to the strong influence of their daily cultural values, compared to the scientific concepts they learn in class. The fifth group is "Inside Outsider", which is a group that feels cultural discrimination by modern science so that they feel that it is impossible to break through the boundaries of the two cultures. This group actually has a big desire, but becomes strange in the classroom / school because the class / school does not provide a place for student's cultural values (student's prior belief). As a result, they feel marginalized (alienated) so that they do not get meaningful scientific knowledge for their lives [3].

A nation whose society is not ready is almost certain to fall by the enormity of natural change and the rapid progress of science and technology, which are the hallmarks of globalization. Therefore, the quality of education must be improved. Schools as educational institutions are required to have creative thinking skills, critical thinking and problem solving, communication, and collaboration or what is commonly referred to as 4C [4]. The Indonesian nation is a nation that is rich in diversity of natural resources, religions, ethnicities, races, customs and cultures. The globalization of the 21st century has shifted the original cultural values of the Indonesian people, so that the local culture is now starting to fade and be forgotten. Globalization is also the cause of the depletion and loss of a nation's native culture [5]. One way to improve cultural values that are starting to fade is to collaborate on ethnoscience in education [6]. Education can be used as a form of effort to empower human potential to inherit, develop and build civilizations in the future. Efforts are made to build civilization by increasing one's understanding of the surrounding environment, especially those related to culture as an ancestral heritage [7]. Culture will be maintained if it is incorporated into learning activities, one of which is in the field of science education. The values of local wisdom contained in different cultures depend on each region, because Indonesia consists of various religions, ethnicities, ethnicities and traditions.

Regional culture, local wisdom, and the surrounding environment can make a certain contribution to the learning experience of students in the form of thinking patterns (cognitive), attitude patterns

![Diagram of student categories](image-url)
(affective), and behavior patterns (psychomotor). Therefore, we need an educational breakthrough that combines culture with science or commonly known as ethnoscience [8]. Ethnoscience (ethnoscience) is etymologically derived from the word "ethnos" from Greek which means "nation" and "scientia" from Latin which means "knowledge". Ethnoscience means more or less the knowledge possessed by a nation or rather a certain ethnic group or social group [9].

The ethnoscience approach is an interesting research at this time. The effect of the application of the ethnoscience approach and the ethnoscience-based additive theme module is able to improve the entrepreneurial character of students and is effective in improving student learning outcomes [10]. Ethnoscience can be integrated in science learning in schools with various learning themes so that knowledge is the result of the construction of the learners' own knowledge [11]. Ethnoscience-based science teaching materials can improve student learning outcomes, both cognitive learning outcomes and affective learning outcomes [12]. Thematic science modules based on ethnoscience have proven to be effective in supporting learning activities, so it is better if local ethnoscience studies are carried out in various regions in order to obtain thematic modules based on various [13]. Ethnoscience-based enrichment books can be developed by containing affective, cognitive, and psychomotor domains so that these books can be a source of student learning in science learning [14].

In general, science learning in schools is still centralized on book material. It is still rare for science learning to really reveal the cultural reality around students. Not many of the material content taught has integrated with culture. Reflecting on this condition, it is necessary to develop learning methods, one of which is the approach used. The application of science learning with an ethnoscience approach requires the ability of teachers to combine original knowledge with scientific knowledge [10]. Research on local wisdom has been carried out in various regions in Indonesia, but research on local wisdom of the Sasak tribe which has been identified as having ethnoscience potential is still rarely done on the island of Lombok, especially with regard to science learning at Junior High School. This study aims to describe local wisdom on the island of Lombok that has the potential for ethnoscience to develop a learning model at Junior High School. The local wisdom includes Sasak Sade Village, Bau Nyale Tradition, Sesek Weaving, Gendang Beleq, and Poteng Reket.

2. Method
This research uses a qualitative approach. According to [15], this approach is used to obtain in-depth data, data that contains meaning. Meaning is real data, definite data is a value behind the visible data, so this approach does not emphasize generalizations, but rather emphasizes meaning.

The data collection method is done by using observation, interview, documentation, and literature study. Observation is a complex process, a process composed of various biological and psychological processes. Observation activities are related to human behavior, work processes, and natural phenomena [16]. Observation activities were carried out by researchers by making direct observations about the local wisdom of the Sasak tribe. The interview is used as a data collection technique if the researcher wants to conduct a preliminary study to find problems that must be researched, and if the researcher wants to know more in-depth things from the respondents. Interviews were conducted by conducting direct question-and-answer with traditional leaders / communities of the Sasak tribe, and parents. Documentation technique is looking for data about things or variables in the form of notes, transcripts, books, newspapers, magazines, inscriptions, meeting minutes, agendas, and others [17]. Documentation is done by gathering information through newspapers, magazines and internet sites. Literature studies are carried out by studying scientific articles in journals and also from books.

3. Result and Discussion
Local wisdom on Lombok Island that has ethnoscience potential are Sasak Sade Village, Bau Nyale Tradition, Sesek Weaving, Gendang Beleq, and Poteng Reket. The following is an explanation of each local wisdom referred to.

Sasak Sade Village.
Sade Village is one of the hamlets in the village of Rembitan, Pujut, Central Lombok, near Mataram. The village community chose to ignore the modernization of the outside world and preferred to continue preserving their old traditions / maintaining the customs of the Sasak tribe and still adhering to maintaining the authenticity of the village. An example of a traditional Sasak Sade house is shown in Figure 2.

![Figure 2. Traditional house of the Sasak Sade tribe.](https://travel.okezone.com/)

The traditional house of the Sasak tribe in Sade hamlet consists of various kinds of bale, all of which have thatched or reed roofs and have their own functions, including: Bale Lumbung, Bale Tani, Bale Jajar, Berugag / Sekepat, Sekenam, Bale Bonter, Bale Beleq Bencingah, Bale Tajuk, Bale Gunung Rate, Bale Balaq, and Bale Kodong [18].

The traditional size in building a traditional house in Sade Hamlet [19] is shown in Figure 3 as follows.

![Figure 3. Sesata, Sedepa, and Sprunjung.](image)

Information:
Number 1 : Sesata, Size Width (distance from the tip of the middle finger to the elbow of the hand).
Number 2 : Sedepa, Size Length (distance from the tip of the middle finger of the right arm to the tip of the middle finger of the left arm is stretched out).
Number 3 : Sprunjung, Size Height (distance from sole of foot to tip of middle finger of hand)

3.1. Bau Nyale Tradition
The smell of Nyale is not known exactly when it started in the agrarian Sasak culture. One of the traces that can be known is only about the story of the incident of Nyale (*Palola paridis* L.), which originated from the tragic and romantic story of a king's daughter named Putri Mandalika [20]. Bau Nyale Tradition is shown in Figure 4.
The *Bau Nyale* tradition is a tradition that is hereditary in the people of Lombok, even this tradition is not only known by the people of *Sasak* (Lombok) but has become a national annual event tradition, and has even become core events, which have been included in the calendar of important events in Indonesia which are released in a collection of national events by the Ministry of Culture and Tourism of the Republic of Indonesia.

### 3.2. Sesek Weaving

The name *sesek* is taken from the origin of the sound when weaving "sek sek". The yarn dyes used in the manufacturing process of this *Sesek* woven cloth come from plants around them [21]. The coloring process can be seen in Figure 5 below.

Coloring materials that are widely used in West Nusa Tenggara [22] include: *Mangifera Indica* (Mangga), *Indigofera Tinctori* (Tarum) *Swietenia Mahagoni* (Mahogany). Other ingredients in the *Sesek* Weaving yarn dyeing are the use of mangosteen peel (*Garcinia mangostana* L), young skin (*Cocos nucifera*) and jackfruit bark (*Artocarpus heterophyllus*) and many also use secang skin (*Caesalpinia sappan* L) but this Secang skin is purchased from Java Island [23]. The paste made from Tarum leaf deposits produces an indigo blue color. To produce black color, it requires a long coloring process because the yarn has to be dipped in indigo solution and cured in the ground repeatedly to get the desired color. After the soaking process, the branches and Tarum leaves can be drained and then burned. The ashes from the Tarum twigs and leaves are used as natural fertilizer in the fields and become a dye mixture when dyeing the threads.
An example of Sesek woven fabric can be seen in Figure 6 below.

![Sesek woven fabric](http://www.muslifaaseani.com/)

**Figure 6.** Examples of Sesek woven fabrics.

The weaving products using natural and synthetic dyes are certainly different. Weaves using synthetic dyes are very bright, solid and colorful. Weaving that uses natural dyes is paler in color with not many choices of colors, this is one of the reasons many weavers in this village use woven threads dyed with chemical dyes to keep up with the market demand for bright and bright colors. In addition, with a longer process, the selling price of weaving using natural dyes is higher.

### 3.3. Gendang Beleq

*Gendang Beleq* is a traditional musical art whose size is more than one meter made of large logs that are perforated in the middle and on each side of the drum is covered with cow, buffalo, goat skin with the aim of producing a good and big sound [24]. An example of a *Gendang Beleq* is shown in Figure 7.

![Gendang Beleq](https://lucianancy.com/)

**Figure 7.** Gendang Beleq

*Gendang Beleq* which is a musical instrument of elliptical shape, the material is made of large logs and the trunk is perforated in the middle with both sides covered with cow, goat or buffalo skin and when hit it will sound "Dang" or "Dung". The sound "dang" seems to be the beginning of the naming of the art, while the Gen prefix is only a complement to facilitate pronunciation. The word *Beleq* itself in *Sasak* means Big, thus, *Gendang Beleq* means Big Drum [25].

### 3.4. Poteng Reket

*Poteng Reket* is a traditional *Sasak* snack, usually only available during certain celebrations such as traditional celebrations or *Idul Fitri* or *Idul Adha* holidays. The process of making *Poteng Reket* is not much different from the partner's snack, namely *Jaje Tujak* (pounded snack), it's just that *Poteng Reket* does not require coconut and is not pounded. An example of *Poteng Reket* can be seen in Figure 8.
The ingredients for making Poteng Reket usually consist of white glutinous rice, tape, saga leaves, sugar, water, and bananas to wrap it. While the ingredients for making Jaje Tujak usually consist of white glutinous rice, black glutinous rice, grated coconut, and salt to taste.

The results of the syllabus analysis of science subjects for grades VII, VIII, and IX, there are 5 basic competencies identified related to local wisdom and can be developed in ethnoscience-based science learning. These basic competencies can be seen in Table 1 below.

**Table 1. Local Wisdom Analysis in Lombok Island with the Potential of Ethnoscience**

| No | Basic competencies                  | Local Wisdom and Ethnoscience                                                                 | Learning                                                                 |
|----|-------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 1  | Apply the concept measurement of various quantities using standard units (standard) | **Sasak Sade Village:** Has a non-standard unit of measure in measuring traditional house buildings. Traditional measures in building traditional houses in Sade Hamlet are: Width: Sesata (distance from the tip of the middle finger to the elbow). Length: Sedepa (distance from the tip of the middle finger of the right arm to the outstretched tip of the middle finger of the left arm). Height: Sprunjung (distance from sole of foot to tip of middle finger of hand). | • Measuring the length of an object with standard and non-standard unit results, to find the importance of standard units in measurement. • Conduct an experiment measuring length, mass, and time using standard and non-standard measuring instruments to get the concept of standard and non-standard units. • Presenting experimental results about measurements with measuring instruments in the form of a written report and discussing them with friends. |
| 2  | Classify living things and objects based on observed characteristics | **Bau Nyale Tradition:** This tradition is a tradition of the Sasak people, especially in Pujut District, Central Lombok. Bau Nyale is a tradition of hunting sea worms that only come out on the coast on the 20th of the 10th month based on the Sasak calendar, usually in February or March. This tradition stems from the belief of the people of Lombok who believe that Nyale (sea worms) that come out on the southern coast of Lombok Island are the result of the | • Observing humans, plants, animals, and objects in the surrounding environment, the symptoms of life that show the characteristics of living things and their classification by senses. • Identify the characteristics of creatures and objects in the environment (including Nyale / sea worms) • Gather information about the |
Basic competencies: Local Wisdom and Ethnoscience: Learning

| No | Competencies | Description |
|----|--------------|-------------|
| 1 | No Basic competencies | incarnation of Princess Mandalika. People believe that this natural phenomenon (the release of sea worms) is a gift in itself that is able to provide welfare for people who catch nyale (sea worms). This sea worm is a type of marine worm with the Latin name Eunice viridis which is classified as a type of filumannelida. Sea worms are included in the group (kingdom) Animalia. Worms (Vermes) are invertebrates. The characteristics of the kingdom animalia, namely: It is a multicellular organism and has specialized cells. Eukaryotic. Does not have chlorophyll so heterotrophs. Requires oxygen in his respiration. Reproduction sexually, some phyla asexually. Classification of living things based on the similarities identified in characteristics, for example the Monera, Protista, Fungi, Plantae, and Animalia groups. Presenting the results of classifying living things in the form of a written report and discussing it with friends. |
| 2 | Explain the concept of mixtures and substances single (elements and compounds), physical and chemical properties, physical and chemical changes in everyday life. | **Sesek Weaving:** The process of dyeing the yarn on Sesek woven fabrics uses the concept of a mixture, physical changes, and chemical changes. The yarn dyes used are made from plant materials, and produce the various colors needed to make the motifs the weavers desire. The colors produced from these materials depend on the use of fixation of alum (Kal (SO4) 2), lime (Ca (OH) 2) or tunjung (Fe SO4). Coloring materials such as jackfruit or mahogany bark, fruit skin with mangosteen or can be used repeatedly by boiling. If these materials can no longer give color, they are burned for cooking purposes, the ashes can be used to clean moss and wash kitchen utensils, as well as natural fertilizers in the fields. Observing various objects in daily life that undergo changes, for example water becomes ice, ice becomes water, water becomes steam, paper / bark / fruit skin from the remaining yarn dye in Sesek Weaving burned to ashes, rusty iron, and food become stale. Observing various objects in daily life that undergo changes, for example water becomes ice, ice becomes water, water becomes steam, paper / bark / fruit skin from the remaining yarn dye in Sesek Weaving burned to ashes, rusty iron, and food become stale. Observing various objects in daily life that undergo changes, for example water becomes ice, ice becomes water, water becomes steam, paper / bark / fruit skin from the remaining yarn dye in Sesek Weaving burned to ashes, rusty iron, and food become stale. Observing various objects in daily life that undergo changes, for example water becomes ice, ice becomes water, water becomes steam, paper / bark / fruit skin from the remaining yarn dye in Sesek Weaving burned to ashes, rusty iron, and food become stale. Observing various objects in daily life that undergo changes, for example water becomes ice, ice becomes water, water becomes steam, paper / bark / fruit skin from the remaining yarn dye in Sesek Weaving burned to ashes, rusty iron, and food become stale. |
| 3 | Explain the concept of mixtures and substances single (elements and compounds), physical and chemical properties, physical and chemical changes in everyday life. | **Gendang Beleg** is an art that is useful for entertaining people around the event, however many people also come all the way to watch this traditional art. Investigating the concept of vibration, waves, and sound, in everyday life. |

4 | Analyzing the concept of vibration, waves, and sound, in everyday life. | **Gendang Beleq** is an art that is useful for entertaining people around the event, however many people also come all the way to watch this traditional art. Observing the phenomenon of vibrations on the swing pendulum, waves on the rope / slinki, the sound of the traditional Gendang Beleg. |
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| No | Basic competencies | Local Wisdom and Ethnoscience | Learning |
|----|--------------------|-------------------------------|----------|
| 5  | Apply the concept of biotechnology and role in human life | **Poteng Reket** is a conventional biotechnology product made from sticky rice that is steamed until cooked, after which it will be cooled, given yeast and left to stand for approximately 2 days. | • Observing various conventional biotechnology products such as *poteng reket*, tempeh, soy sauce, tape, nata de coco, etc.  
• Distinguish conventional and modern biotechnology principles  
• Conducting experiments to make conventional biotechnology products, for example making *poteng reket*, tape, tempeh, or yogurt  
• Gather information about the application of modern biotechnology to support human survival and discuss the results with friends | 

In order for basic competencies and local wisdom values to be developed through local culture-based science learning, the teacher's role in the learning process is as follows. (1) Give students the opportunity to express their thoughts, to accommodate the concepts or beliefs that students have that are rooted in original science (culture). (2) Presenting students with examples of discrepant events that are actually commonplace according to Western scientific concepts. (3) Play a role in identifying cultural boundaries to be passed and guiding students across cultural boundaries, so as to make sense when cultural conflicts arise. (4) Encourage students to actively ask, comment, and solve problems, and (5) Motivate students to be aware of the positive and negative effects of Western science and technology on life in their world [26].

Mapping local wisdom is an effort to preserve community culture, and the data obtained requires lab tests to be reconstructed into science. This reconstruction is useful for enriching ethnoscience
studies for cultural preservation [27]. Scientific concepts that can be identified from local wisdom are quantity, unit and size, classification of living things, elements, compounds, and mixtures. The results of the reconstruction of public knowledge about the process of implementing customs (culture) can be integrated with science learning [28].

The development of scientific literacy needs to be done by considering the preparation of future generations of scientific literacy through culture-based curricula to produce more contextual learning, especially the learning resources used in the classroom. The learning process raises local culture related to science learning. This type of learning resource will facilitate students' understanding of concepts because they are related to community culture and daily life. Thus, ethnoscience pedagogy in science learning can develop students' scientific literacy in terms of content, competence, context, and attitudes [29].

Human resources with good character are needed in national development in Indonesia. Therefore, character development of students, especially character development based on local wisdom is needed. Learning activities that can develop student character are exploration, concentration, inquiry from various perspectives (scientific, sociocultural, historical), elaboration, and affirmation [30]. Culture in the form of local wisdom has the potential for Ethnoscience to be a source of knowledge that can be explored to increase students' enthusiasm for learning. The correct learning attitude has an impact on the mastery of science concepts which continues at the stage of developing students' critical thinking skills in explaining natural phenomena. Ethnoscience-based science learning shows that students can be directly involved in finding concepts and disclosing phenomena in their environment [31]. If the student culture is in accordance with science lessons, it will reinforce each other, but if it is different, it will be developed together in parallel without alienating [32].

4. Conclusion
Local wisdom on the island of Lombok that has the potential for ethnoscience to develop learning models at Junior High School is Sasak Sade Village, Bau Nyale Tradition, Sesek Weaving, Gendang Beleq, and Poteng Reket. The basic competencies identified in relation to the local wisdom are: 1) Implementing the concept of measuring various quantities using standard units (standard); 2) Classifying living things and objects based on observed characteristics; 3) Explain the concept of mixtures and single substances (elements and compounds), physical and chemical properties, physical and chemical changes in everyday life; 4) Analyzing the concepts of vibrations, waves and sounds, in everyday life including the human hearing system and the sonar system in animals; 5) Applying the concept of biotechnology and its role in human life.

The suggestion that researchers can give to readers is that further research is needed on the effect of ethnoscience integration in learning models such as inquiry learning models, discovery learning models, problem-based learning models, project-based learning models, or other learning models.

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