



Identification of Local Wisdom of The Sasak Tribe In Chemistry Learning as an Effort to Strengthen Student Character

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Abstract: Globalization has a negative impact on local wisdom and the character of the successor of the Indonesian nation. It causes the culture of other countries to influence local wisdom so that it experiences a shift and slowly disappears. It triggers youth violence and erodes morals, character, sense of humanity, and nationalism. Students who are dominated by the Sasak tribe are currently less familiar with their traditions and culture. The solution to this problem is to integrate local wisdom into formal chemistry learning. This study aims to identify local wisdom of the Sasak tribe that can be integrated in chemistry learning. The approach used in this research is qualitative. The research sample is cultural practitioners and the Sasak people. Sampling using purposive technique. The implementation of this research consists of four stages based on data analysis of the Miles and Huberman Model, namely data collection, data reduction, data presentation, and drawing conclusions. The data collection technique is triangulation, which combines interviews, observations, and documents. The results of this study are local wisdom of the Sasak tribe that can be integrated in chemistry learning. The local wisdom includes mopping with cow dung, dilah jojor, nyesek, and gendang beleq. The results of the analysis of local wisdom show that there is relevance to chemistry, namely the concepts of organic compounds, inorganic compounds, chemical bonds, elemental chemistry, instrument analysis, chemical separation, and chemistry of natural materials. The integration of local wisdom into chemistry learning has an impact on maintaining the existence of local wisdom of the Sasak tribe as well as strengthening the character of students.

Keywords: Character strengthening; Chemistry learning; Local wisdom; Sasak tribe

Introduction

Globalization is a process of social change across national borders in various aspects of life, such as economics, politics, culture and the environment. In Indonesia, globalization can be seen in changes in people's lifestyles (Inayati, 2019; Ohy et al., 2020), social changes in structural, cultural, and interactional dimensions (Tejokusumo, 2015), changes in the value of national nationalism (Agus & Zufahmi, 2021; Azima et al., 2021).

Globalization has a very positive impact that is felt today, namely the opening of information and the rapid development of technology that is very helpful in

everyday life. On the other hand, globalization erodes one by one aspect both in the social and cultural aspects of the nation. Globalization causes the culture of other countries to influence Indonesian culture. If left unchecked, the traditions, culture, or local wisdom of the country itself will fade. Globalization causes the culture of other countries to influence the wisdom of Indonesian culture. The negative impact of globalization on local wisdom is already visible today, such as the local cultural tradition of the Baratan party which is currently being held has experienced a shift in meaning and purpose (Ulum & Suharno, 2019), most of the variety of traditional children's games in Banyumas Regency are on the verge of extinction (Dadan & Widodo, 2020),

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Ngobeng tradition has undergone many shifts (Fitriah, 2019).

Globalization also has a negative impact on the character of the nation's next generation, including students. Globalization indirectly triggers youth violence (Indratmoko, 2017) and the erosion of morals, character, sense of humanity, and nationalism (Efendi & Zulfahmi, 2021; Budiarto, 2021). Students of the Chemistry Education Study Program are dominated by the Sasak tribe. However, on several occasions researchers have observed that they themselves are not familiar with the local wisdom of the Sasak tribe.

The problem of eroding local wisdom can be minimized and prevented by means of local wisdom itself needing to be preserved by studying it formally. Students spend a maximum of 24 credits in formal learning, which means that students' study time in a week is 20 hours face-to-face, 24 hours structured assignments, and 24 hours independent activities. If this amount of time is also used to study local wisdom, local wisdom will remain sustainable. Studying chemistry means learning things in human life because chemistry is in everyday life and even exists in humans themselves. Therefore, chemistry is also integrated into local wisdom or in other words local wisdom can be explained based on chemistry.

However, most chemistry teachers in NTB Province, where the Sasak tribe is located, have not used the local wisdom approach in teaching chemistry, both in class and in the laboratory (Andayani et al., 2021). Likewise with learning at the Chemistry Education Study Program, Mandalika Education University. The discussion on chemical content has not fully raised local wisdom in Indonesia, especially in NTB. The reasons put forward by the teachers and lecturers were the unavailability of learning resources that studied local wisdom based on chemistry or vice versa. Therefore, this study aims to identify the local wisdom of the NTB area starting from the Sasak tribe and then analyzing it based on chemical concepts. The results of the recommendations of this study will be useful as a source of meaningful chemistry learning.

Integrating local wisdom in chemistry learning can strengthen the character of students. According to Rakhmawati & Alifia (2018), local wisdom in learning mathematics plays a role in strengthening students' character. Ramdani (2018) added that character strengthening can be done using local wisdom-based contextual learning models. Even the learning media in the form of a herbarium based on local wisdom is also a successful effort to strengthen character (Ami & Yuliana, 2021). Several studies agree that the integration of local wisdom in learning is an effort with great opportunities to strengthen character because local wisdom can develop human sensitivity and attitudes.

The purpose of this study is to identify local wisdom of the Sasak tribe that can be integrated in chemistry learning. The benefits of this research are directly the results of this study can be used as study material in chemistry learning as well as the basis for developing learning programs and character strengthening programs. In addition, this research is useful in introducing and preserving the local wisdom of the Sasak tribe.

Method

This study uses a qualitative approach. Data sources are divided into primary sources in the form of cultural practitioners and the Sasak people, and secondary sources in the form of documents. The samples in this study were cultural practitioners and the Sasak people. Sampling using purposive technique where the sample is selected based on the research objectives. Researchers chose cultural practitioners and the public who could provide information about local wisdom of the Sasak tribe.

The implementation of this research consists of four stages based on data analysis of the Miles and Huberman Model as seen in Figure 1, namely data collection, data reduction, data presentation, and drawing conclusions. In qualitative research, data analysis is carried out simultaneously with data collection.



Figure 1. The implementation stages of research

Data collection

The data collection technique used is triangulation, which combines interviews, observations, and documents. Semi-structured interviews (in-dept interviews) were conducted on three cultural observers. Observations are made to observe the socio-cultural behavior of the community and if necessary, unstructured interviews will be carried out according to the situation. Collecting data through documents in the form of photos, books, and research journals.

Data reduction

At this stage a re-examination of the data that has been collected is carried out, then a separation is made between the data that is needed and not. Data that is not needed because it does not match the problem formulation will be discarded. Researchers only take important data.

Data presentation

Presentation of data in the form of charts and descriptions. The chart is like a concept map to show the relationship between the elements in local wisdom and the chemical concept, while the description is to explain the relationship in more depth so that it can be understood.

Drawing conclusions

The final stage is to make conclusions based on the previous process. In addition, researchers will provide recommendations to partners so that the results of this research can be used as material for developing learning programs in the Chemistry Education Study Program, Mandalika University of Education.

Result and Discussion

The Sasak tribe is one of the indigenous tribes of West Nusa Tenggara province and mostly occupies the island of Lombok. Islam and tradition are the identity of the Sasak tribe that shape the behavior of the Sasak people to become devout Muslims and highly cultured at the same time (Wahyudin, 2018). The traditions of the Sasak people are reflected in every aspect of their lives. Based on the results of observations and interviews, it was found that several forms of local wisdom were attached to the Sasak tribe until now. However, not all of these data were taken for further discussion because they were not related to chemistry. Therefore, data reduction was carried out in accordance with the purpose of this study, namely identifying the local wisdom of the Sasak tribe which is directly related to chemistry so that it becomes a recommendation in learning chemistry. The local wisdoms of the Sasak tribe that have been identified include mopping with cow dung, dilah jojor, nyesek, and the art of gendang beleq. The following is an explanation of each of these local wisdoms accompanied by a study of chemistry.

Mopping with cow dung

The tradition of mopping the floors of houses using cow or buffalo dung occurs in Sade Hamlet. Sade Hamlet is located in Rembitan Village, Pujut District, Central Lombok Regency. Sade is famous as a traditional village of the Sasak tribe which still maintains its values and ancestral traditions to this day. One of the traditions from their ancestors is to mop with the dung of the cows or buffalo they keep. This tradition is carried out by married women at least once every month. According to local beliefs, cow dung makes floors stronger so they don't crack easily, protects the house from mosquitoes and other insects, and keeps the house warm during the rainy season and cools the house during the summer.

From the beginning the floor of the house was made of cow dung mixed with clay and straw ash. This mixture makes the floor solid as hard as cement (Muaini

et al., 2021). Cow dung is a mixture of manure and urine with a ratio of 3:1, which contains cellulose, hemicellulose, crude fiber, crude protein, and 24 types of minerals (Swain et al., 2012). Even though the floor was covered in dirt, there was not the slightest smell when the floor was dry.

When dry, cow dung serves to coat the floor like cement. This is what makes the floor of the Sade traditional house stronger. Buffalo dung has almost the same content as cow dung. The use of cow and buffalo dung in modern construction has been investigated and known in the form of Cow Dung Ash (CDA) and Buffalo Dung Ash (BDA). The ash is produced from burning cow dung that has been dried. The physical properties of cow dung have a large ash content (Thakur et al., 2019). Both CDA and BDA are believed to have cement-like properties due to the high concentration of pozzolanic minerals (Al, Fe, Mn, K with O) (Jagadesh et al., 2017). Some research results suggest partially replacing cement with CDA or BDA (Jagadesh et al., 2017; Palanisamy et al., 2018). CDA has advantages such as being very economical in terms of cost, reducing the risk of environmental damage, and maintaining ecological balance (Thakur et al., 2019).

Another benefit of cow dung is to repel mosquitoes. Cow dung alone or in combination with other species of mosquito repellent plants can be used as a raw material for mosquito repellent products. Cow dung as a herbal repellent is safe for humans and pets, provides long-term protection, and has no side effects (Mukherjee & Ghosh, 2020). In another way, burning cow dung can prevent mosquitoes from entering the house, coating the floor with fresh cow dung and water to prevent flies, and cow dung ash can control the entry of pests (Raja et al., 2021). On the other hand, cow dung can reduce the thermal conductivity that passes through it (Thakur et al., 2019) so that the house does not feel hot during the dry season.

In chemistry learning, based on the explanation above, the tradition of mopping with cow dung can be developed in the discussion of organic compounds, inorganic compounds especially about minerals, chemical bonds which discuss the structure and silicon bonds in cow dung ash, and the chemistry of natural materials discussing aromatherapy for mosquito repellent.

Dilah jojor

Dilah jojor or dile jojor comes from the Sasak language. Dilah or dile means lamp, while jojor expresses a shape like satay. Dilah jojor is shaped like a large satay that functions like a torch. Historically, dilah jojor was used as a light when there was no electricity. Currently, dilah jojor can be found once a year in several areas in Central Lombok Regency, such as Jabon Village, Bonjeruk Village, and Bagu Village. Dilah jojor is lit after

breaking the fast on odd nights in the last ten days or the 21st, 23rd, 25th, 27th, and 29th nights of the month of Ramadan. Dilah jojor is plugged in the ground or tied to trees in the yard. The tradition of lighting the dilah jojor is also called the maleman tradition. This tradition is carried out by the community as a form of hope for Lailatur Qadar to come down at his house.

Jojor dilah is made from the seeds of nyamplung fruit or *Calophyllum inophyllum* L. The process of making jojor dilah is quite simple but takes a long time. Nyamplung fruit seeds are peeled, cut, and then dried in the sun. The dried seeds are pounded until smooth. The results of the collision are mixed with cotton and then glued or wrapped around a bamboo stick to form a satay-like shape. The size of the bamboo sticks used varies, usually 15 cm, 20 cm, 30 cm or 40 cm. Next, the jojor is dried again until it is completely dry. If it is dry, jojor is ready to use.

The seeds of nyamplung in dilah jojor can light up because they contain oil. The content of this greenish yellow oil reaches 65.8%. The composition of nyamplung seed oil is unsaturated fatty acids as much as 68.49% and saturated fatty acids as much as 31.51%, with the main content being 9-octadecanoic acid as much as 43.43%, which is then followed by 9,12-octadecadienoic acid (23.94%), hexadecanoic acid (15.33%), and octadecanoic acid (10.66%) (Muderawan & Daiwataningsih, 2016).

Nyamplung oil has the potential as a source of biodiesel production. However, nyamplung oil has a fairly high acid number and viscosity. The high acid number of nyamplung oil must be reduced so that the biodiesel produced meets the quality standard of SNI Biodiesel (Hartono et al., 2021). The first step in making nyamplung biodiesel is the degumming process or the removal of impurities such as gum, then proceed with esterification which aims to convert free fatty acids (FFA) into methyl esters, then enter the transesterification process which converts triglycerides in oil into methyl esters and glycerol (Christina et al., 2011; Muhammad et al., 2014; Nurhidayanti, 2019; Rahayu, 2015).

Many aspects can be learned from the dilah jojor tradition that can be developed in learning, such as the process of extracting nyamplung oil, the factors that affect the quality and quantity of nyamplung oil, the process of making biodiesel from nyamplung oil, and the various compounds and reactions involved in the above process. Thus, the dilah jojor tradition is relevant to the concept of organic compounds, chemical separation, instrument analysis, and the chemistry of natural materials.

Nyesek

Nyesek is the activity of weaving cloth for the Sasak tribe. Woven fabrics are called sesek fabrics. According

to history, nyesek is a skill that must be owned by Sasak women, even girls are allowed to get married if they can nyesek. This value is still applied in several places such as Sukarara Village and Sade Village in Central Lombok Regency and Pringgarata Village in East Lombok Regency. Nyesek is a daily activity for Sasak women apart from farming and is used as a source of income to help the family's economy.

The yarn on woven fabrics used to be the result of spinning cotton. Currently, weavers use factory-processed yarn. There are three kinds of yarn used in weaving in Pringgasela Village, namely cotton yarn, cotton yarn, and merse yarn. The three types of yarn are made from the same cotton, but with different finishing. Cotton yarn has a better quality than cotton yarn seen from the twist of the yarn so that it becomes stronger. Mercer yarn is the best because of the tighter twist and mercerized process that makes this type of yarn stronger, smoother and shiny (Juniati, 2020).

The local wisdom of sesek cloth can be seen from the thread coloring process that uses natural dyes. The coloring materials used usually come from plants around their homes. In Pringgasela Village, the dyes used included mango leaves, mangosteen rind, mahogany bark, sappan wood, and jackfruit bark. In Sukarara Village, natural dyes are obtained from tamarind seeds, betel leaves, teak tree leaves and stems, mango leaves, pace leaves and fruit, mahogany bark, and tahum leaves. However, there are also weavers who use synthetic dyes for more practical and effective reasons. Synthetic dyes used include naphthol and indigosol.

The process of coloring yarn using dyeing technique. The coloring matter is first extracted by boiling it in water for about 1 hour. The yarn are soaked in boiled water that has previously been filtered and cooled. This soaking time depends on the desired color density. The longer the soaking, the darker the color of the yarn produced. The next process is fixation, namely soaking the yarn in a solution of quicklime ($\text{Ca}(\text{OH})_2$), alum ($\text{Al}_2(\text{SO}_4)_3$), or tunjung (FeSO_4) to lock and strengthen the coloring.

According to Darma et al., (2015), mango leaves produce black color, tahum leaves produce blue, turi leaves and bark produce purple, tamarind seeds produce brown, teak leaves and bark produce red, mahogany bark produces reddish brown, betel leaf produces red, pace leaves produce blue, pace fruit produces bright green, and pace wood produces dark yellow. The fixation process also affects the color of the yarn. The bark dye of mahogany (*Swietenia mahagoni*) produces a dark brown color when using alum as fixation material, while using quicklime during the fixation process produces a reddish brown color (Ciptandi et al., 2021).

Based on the explanation above, the concepts relevant to the nyesek tradition are organic compounds, inorganic compounds, elemental chemistry, compound nomenclature, and chemistry of natural materials.

Gendang beleq

Gendang beleq is the local wisdom of the Sasak tribe in the art of music. Gendang is a form of this musical instrument while beleq comes from the Sasak language which means big. The drum is made from a meranti or randu tree trunk and the two sides of the hole are covered with the skin of a goat, cow or buffalo. At first, the beleq drum was played when escorting soldiers to war. A voice that is believed to raise the spirit and increase the courage of the soldiers. Along with the times, the gendang beleq is currently played in traditional events, weddings, or other cultural events.

The art of gendang beleq is played in groups. Gendang beleq belongs to an ensemble consisting of gendang mame, gendang nine, cemprang, perembaq, petug, oncer, rincig, reong mame, reong nine, gong mame, and gong nine (Sumardi, 2017). Meanwhile, according to Yudarta, the instruments contained in the gendang beleq ensemble include the gendang beleq, ceng-ceng perembaq, riyong, gong, petuk and suling. According to Saputra (2020), based on the function of each instrument in the ensemble, it can be identified that in the drum beleq ensemble there are only two groups of instruments, namely melodic and rhythmic instruments. The melodic instrument group consists of the flute and reyong, while the rhythmic instrument group consists of the drum, gong beleq, petuq, rincik, kenceng, and kempur instruments.

The drum in the Gendang Beleq ensemble is an instrument that is considered quite iconic which later became a marker (identity) of this art. Reyong is an ideophone type instrument made of various metals such as iron, brass, or bronze. Similar to reyong instruments, gongs are included in the category of ideophone instruments. Generally, many gongs are found made of iron. The oncer or petuq instrument is one of the most important musical instruments in maintaining the tempo. The detailed instrument is an additional instrument that functions as a tempo and at the same time fills the gaps in the empty gending when the kenceng is not played. Kenceng instruments have a very important role because players are required to have mastery of various rhythmic patterns. Petuq, rincik, and kenceng are made of bronze (Saputra, 2020).

Some gendang beleq players believe that instruments made of bronze tend to produce better sound quality when compared to instruments made of iron. Even though the results of other research stated that there was no difference in the fundamental frequency of instruments made of either bronze or iron (Wijayanto, 2014). Bronze is a metal alloy of copper and

tin. The use of bronze as a material for making musical instruments has its own advantages because the tin content is the most important factor to prevent cracks from occurring when forged (Slamet, 2021).

The instruments in the gendang beleq ensemble are made of metal or a mixture of metals. This can be studied further in the discussion of elemental chemistry, inorganic compounds, and chemical bonds.

Strengthening student character through local wisdom

Local wisdom is the noble values that apply in the life of the community (UU No.1 Tahun 2014). These values maintain the harmony of humans with humans, humans with nature, and humans with God in carrying out life and life (Wagiran, 2012). Wisdom is found in all aspects of life, such as art, language, social organization, and livelihoods in the sea, rice fields, and forests (Marjanto & Utama, 2013). Local wisdom is a big force in building the nation's character (Wagiran, 2012; Harmawati, et al, 2016) and increasing awareness of preserving the environment (Sufia et al., 2016). Therefore, the existence of local wisdom must be preserved, one of which is by providing knowledge about local wisdom (culture knowledge) (Nahak, 2019).

The integration of local wisdom into learning has a positive impact on students, such as easier to understand lessons (Atmojo & Wafa, 2022), being cultured and having guidelines in attitude (Sarnely et al., 2019), creating harmony between knowledge and attitudes that are instilled for the growth of values in society (Hartini, et al. , 2018), as well as improving students' science process skills and scientific attitudes (Dwianto, 2017). The application of local wisdom in learning is in the form of modules (Pertiwi & Firdaus, 2019) (Tahya et al., 2022), learning media (Irawati et al., 2022; Dwipayana et al., 2020), teaching materials (Sarini & Selamet, 2019; Andayani, et al, 2021), enrichment books (Khotimah, 2013), and learning model (Yanti et al., 2022).

According to Rahmawati & Ridwan (2018), Indonesia has around 300 ethnic groups with different values, beliefs, and practices that are explored in a limited way in the context of learning chemistry. Studies of local wisdom and existing chemistry include the use of green coconut water in Javanese culture on electrolyte and nonelectrolyte solutions and Ngeyeuh Seuruh Sundanese sacred tradition on acid-base concepts (Rahmawati, 2018), making bread coe cakes typical of North Maluku can be explained by hydrolysis concepts (Robo & Taher, 2021), Keris can be associated with voltaic cell material, corrosion, and elemental chemistry and Wayang kulit can be associated with polymer and colloid concepts (Azizah & Premono, 2021), Cirebon local wisdom, namely batik can be used to learn the concepts of organic chemistry (especially those related to aromatic derivatives and polymers), electromagnetic

radiation, chemical bonds, acids and bases, redox, and stoichiometry (Anugrah & Kartimi, 2022).

Through the implementation of local wisdom, it is hoped that an education system will be created that is able to prepare quality human resources and is ready to compete in the global era, but has strong character, personality, moral and ethical values (Wagiran, 2012). National education does indeed function to form character as mandated in Pasal 3 UU No. 20 Tahun 2003 concerning the National Education System. More specifically, the government has launched a character strengthening program in welcoming the 2045 golden generation. The program is implemented by applying Pancasila values in character education, especially including religious values, honesty, tolerance, discipline, hard work, independent creative, democratic, curiosity, national spirit, love for the homeland, respect for achievement, communicative, love peaceful, likes to read, cares about the environment, cares about social, and is responsible (Perpres No. 87 Tahun 2017).

A person's character is formed from home, school, and the community environment (Dalyono & Lestariningsih, 2016). Character education can be inserted in all subjects with a note that it must be well prepared. The results of the research by Solihah et al., (2022) stated that character strengthening was successfully carried out by management making clear stages, namely planning, organizing, implementing, and supervising. Conversely, strengthening unstructured and planned characters in the curriculum causes the expected character values to not be achieved (Aswat, et al, 2022).

Character strengthening is carried out through various approaches, such as exemplary, classroom learning, integrating character education in all subject matter, integrating character education in co-curricular and extracurricular activities, empowerment and acculturation, and strengthening (Darmuin, et al, 2012). In Perpres Nomor 87 Tahun 2017, strengthening character in formal education units is carried out in an integrated manner in intra-curricular, co-curricular and extra-curricular activities. Intra-curricular activities are meant through activities to strengthen learning materials or learning methods in accordance with the curriculum content.

Conclusion

The local wisdom of the Sasak tribe is very diverse in every aspect of people's lives. This research has identified local wisdom that can be developed in chemistry learning. These local wisdoms include mopping with cow dung, dilah jojor, nyesek, and gendang beleq. The results of the analysis of local wisdom show that there is relevance to chemistry, namely the concepts of organic compounds, inorganic

compounds, chemical bonds, elemental chemistry, instrument analysis, chemical separation, and natural product chemistry. Through formal learning, students understand the material as well as recognize themselves and their environment which can foster a sense of love for the nation and other Pancasila values. The integration of local wisdom into chemistry learning has an impact on maintaining the existence of local wisdom of the Sasak tribe while at the same time strengthening the character of students.

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