PROJECT
(Professional Journal of English Education)
Volume 7, No. 2, March 2024
p–ISSN 2614-6320
e–ISSN 2614-6258

DEVELOPING STUDENT'S SCIENTIFIC LITERACY BY INCORPORATING LOCAL TERMS AND SOCIOCULTURAL PHENOMENA INTO SCIENCE TEACHING-LEARNING PROCESS

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Abstract

The lack of integration between science and culture, students' social-life and science experiences, as well as between students' sociocultural and science world, creates a "gap" between both aspects. When students fail to transition their school science situation and knowledge to real-life cultural experience or vice versa, they refuse to learn science deeper because science might threaten their sociocultural beliefs. As a further consequence, this condition will result in low scientific literacy. It is essential to increase students' scientific and cultural literacy because it helps young generation to marry science and culture effectively. Based on literature review done by the author, it shows that integrating local language and sociocultural phenomena into science classrooms can enhance students' motivation and interest in science and increase learning achievement. Connecting more students' social-cultural aspects, particularly language and life experience, can help to increase scientific literacy.

Keywords: Scientific Literacy; Socio-Cultural Phenomena; Science Teaching

INTRODUCTION

Having experience working in a diverse community and the outermost province of Indonesia, theauthor has witnessed that some students consider science tough, uninteresting, boring, and foreign.Most teachers fail to engage the students in a science classroom not entirely because of the pedagogy, but also, they unintentionally treat science as a subject not as a knowledge that studentsneed to support their everyday life and solve their social science-related problems. Teachers mightunintentionally lead the students to ignore the fact that in human endeavor and scientific discovery,the social-cultural aspect is one of the crucial considerations to be included (Reis, 2015). As also stated by Kelly et al., (1993) "science is a product of the culture that produces it" (p. 213). It meansthat each community has its local science, and that knowledge should be known among the generation. Thus, students must be able to bring knowledge from the classroom to real-life circumstances and correlate their real-life experience as part of the local community to the teaching-learning process (Zidny, 2022). In the simplest conclusion, it should in the classroom, science and culture be taught as an integration. With this applied, students no longer perceive science as "a why-should-learn knowledge" but merely more to as "a-should-learn knowledge".

Other than the pedagogy, the fact that students' diversities in terms of their spoken languages, multilingual is becoming the main consideration. As the author has been living and working as a teacher in East Nusa Tenggara (ENT), here the author takes ENT to illustrate the situation.

Thereare 72 traditional languages that are still actively used (Kemdikbud, 2022). In some areas, such asKupang, the capital city of ENT, some schools are bilingual and take English as the main language used. Meanwhile in their everyday life, local students use Indonesian language in their teaching- learning process and "Bahasa Kupang" or traditional language for daily conversation. This complexion of using language as a tool of communication and interaction makes students hardly follow the instruction and the learning comprehension as they are sometimes unrelated to the context due to the language barrier.

On the other hand, students are expected to become critical citizens who are responsible, analytical, and creative in responding to phenomena in their environment. Students should be able to succeed in meaning-making, utilize their knowledge from the classroom to real-life application, and correlate their science-social world after attending the teaching-learning process (Zidny, 2022). It is crucial for students to "find" their culture in the science classroom through class activities, either explicitly or implicitly, and students need to be able to "utilize" science in their social-culture community (Tobin, 2015). Moll et al. (1992) believes that in the learning process, the connection between that two knowledge can help students to realize the relationship between school knowledge and household. Similarly, Soko et al. (2017) argued that situated learning based on familiar context eager student curiosity and excitement in learning about physics and science concepts. It is clear that there is an urge to increase students' literacy not only scientifically but also culturally. When students are scientifically literate and culturally literate, as young generation, they will be able to marry science and culture effectively as inseparable factors in human life (Lähdesmäki et al., 2022).

As has been reported by Zubaidah & Arsih (2021) that "based on teacher survey done in West Sumatra, 96.92% teachers thought that culture-integrated science learning could provide benefits for biology learning" (p. 3). It also cited from previous research that the implementation of Problem Based Learning that culturally based has proved that it has "an effective impact on the quality of learning (student social attitude, scientific creativity, and cognitive performance in biology)" (2021, p. 4). Also in the similar report, the author presented their result of implementing culture-integrated science learning pedagogy which has been successfully increasing students' interests in learning science which result in better understanding of science.

The lack of integration between science and culture, students' social-life and science experience, as well as between students' social-cultural and science world, creates a "gap" between both aspects. Supported by research reported in Ladson- Billings (1995a), failure to integrate students' home and school cultures and incorporate home languages into the classroom resulted in students' difficulty and struggle in the learning process. It also happens when teachers include more western perspectives or foreign contexts in teaching science. As a result, students become more skeptical of science and have less opportunity to investigate their cultural roles in science (Kanesa, 2014; Kasi et al., 2022; Soko et al., 2017).

When students fail to transition their school science situation and knowledge to real-life cultural experience or vice versa, they refuse to learn science deeper because science might threaten their sociocultural beliefs (Aikenhead & Jegede, 1999). As the further consequence, if the failure of bridging science and social culture keep happening, it will result in low scientific literacy.

Therefore, the author believes that integrating local language and sociocultural phenomena into science classrooms can enhance students' motivation to learn science which simultaneously increase students' interest in gaining more science knowledge which result in

an increasing of learning achievement. Connecting more students' social-cultural aspects, particularly language and life experience, can help to increase scientific literacy. In this report, the author will present the issue from the US and Indonesian context and at the end of this report will be presented alternatives to teach science based sociocultural in Indonesia, particularly in East Nusa Tenggara.

METHOD

This study report was a literature review discussing on developing student's scientific literacy by incorporating local terms and socio-cultural phenomena into science teaching-learning process. Using e-journals provided in universities library database, the previous literature was collected. The literature was limited to articles that published from 2000 to 2022 and focused on the keywords"scientific literacy" and "science and culture" with a consideration to focus more on science and culture in East Nusa Tenggara. These keywords were set as the objective of the report is to see theconnection of students' social-cultural aspects, particularly language and cultural phenomena to their science learning process, can help increasing scientific literacy. Based on the keywords, morethan 50 articles were obtained, but after sorted using LGL (List, Group, and Label) technique, 15articles were decided to be used as the articles had relevant topics and meets the objective. In addition, author provide alternative ways to teach science in East Nusa Tenggara (ENT) by integrating ENT's local science into science classroom.

RESULTS AND DISCUSSION

Results

Based on the procedure and method, the literature review provides the relation of aspects that have been focused on as shown in diagrams below.

Diagram 1.
The relationship of lack integration of science and culture to low scientific literacy

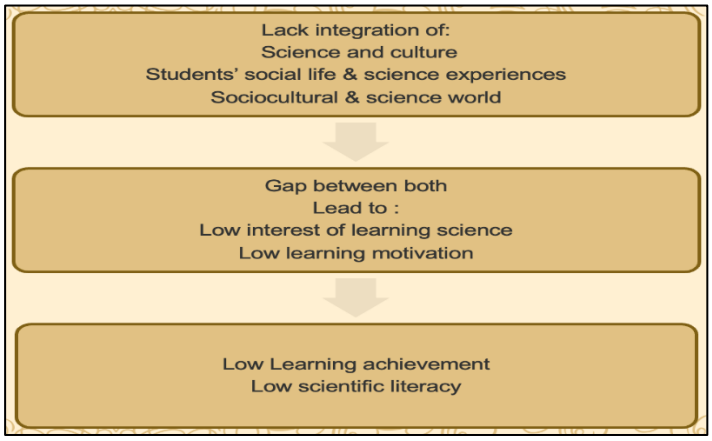
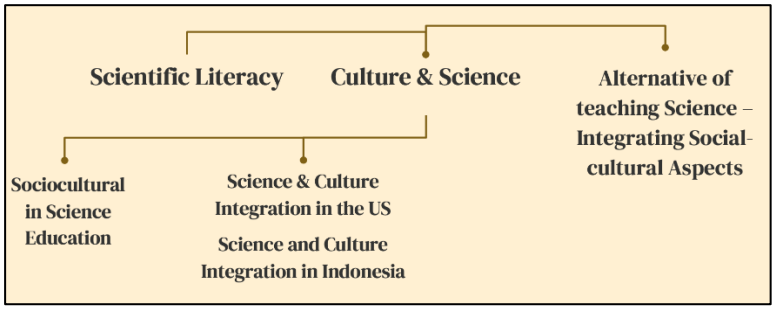


Diagram 2.
The alternative for connecting science and culture to increase scientific literacy



Discussion

Scientific Literacy

Scientific literacy is essential for every person as almost of the problem they are facing require the understanding of science, mathematics, and technology, despite their backgrounds. Understanding science opens the insights to analyze the phenomenon happening in the environment and community and provide reasonable solutions and arguments. Since scientific literacy is multidimensional, scientific literate people can utilize and implement science in their social- cultural context effectively (Ogunkola, 2013). They can see the problem through a scientific lens,connect to other perspectives, and understand the consequences and how it will be in the long term.It means people can have sustainable knowledge when they are scientifically literate. As the worldkeeps evolving, humans should develop critical thinking skills, good decision-making skills, innovation, rationality, and flexibility which are indicators of having scientific literacy.

In Indonesia, scientific literacy and scientific culture have been a concern for a long time. It is because literacy has been one of the 2030 Agenda for Sustainable Development (Sustainable Development Goals - SDGs) which Indonesia should achieve. Based on Putera et al. (2022), the Indonesian government has been increasing scientific journal publications, establishing more policies and institutions, and providing more awards and incentives to encourage more people to improve scientific literacy.

Besides scientific literacy, cultural literacy has been considered to be integrated into the newest curriculum. Based on Lähdesmäki et al. (2022), students must understand their role as active cultural agents besides their need for cognitive development. As cultural agents, children should be able to communicate their learning outcomes and knowledge with tolerance to their culture andscience world. With sufficient cultural literacy, children can potentially process and allow new ideas and respect differences and similarities to other subjects, particularly science, which sometimes contradicts culture. Scientific and culturally literate can reduce the gap between the science community (scientific phenomena) and cultural community (everyday live phenomena); a great result, students can connect and combine both perspectives to provide a solution and answer for social-science issues. Thus, the connection between science and culture is vital for scientific literacy achievement. Researchers have also introduced some

alternatives to improve scientific literacy. One way has been mentioned by Ke et al. (2021) about Socio-scientific Issues (SSI). SSI enables teachers to improve science literacy using real-life experience. Sadler et al. and Zeidler et al., in Ke et al. report, claimed that "SSI-based instruction requires students to consider the science dimension and the social ramifications of the issue to develop positions or solutions around the issue" (Ke et al., 2021, p. 590). Using this instruction in learning can help students become problem solvers in dealing with science-oriented environmental problems. Besides, modeling can be an alternative to develop students' skills in incorporating the material they have learned into hands-on and feasible engaging tools. Teachers can use students' experiences as anchoring phenomena in the teaching- learning process. They can increase the engagement and interaction of science and social factors that promote more scientific models that help students be ready to encounter more complex issues. Thus, introducing the correlation of science and socio-factors in the classroom brings more opportunities for students to learn directly about the integration of science and their social lives, alerting them of critical citizens' cruciality and scientific literacy. The student will be aware of the roles of providing solutions and explanations to the socio-scientific phenomenon in their circumstances and enhancing their scientific knowledge simultaneously.

Culture and Science

1) Sociocultural in Science Education

"Science is a product of the culture that produces it" (Kelly et al., 1993, p. 213) means that science is inseparable and integrated on social and political in certain circumstances. Scientific knowledge development depends on social conditions and determines its construction, instruction, and pedagogy. Science education must balance social deliberation with empirical warranty and sociocultural values.

Students in the science classroom come from different communities, making them have diverse cultures, particularly in their languages and cultural attributes. This condition is happening in the US, which has many immigrants, and in Indonesia that has 781 languages and 1300 ethnic groups. Because of different cultural attributes, each individual socializes, their role in the community and the ways of dealing with problems are diverse (Buxton et al., 2019). That what was Moll et al. (1992), termed as funds of knowledge. Funds of knowledge based on Moll et al. (1992) can be concluded as the accumulation of social-cultural-historical practices in the community that become beneficent knowledge and skills for households or individuals in surviving and solving their everyday challenges. "By capitalizing on household and other community resources, we can organize classroom instruction that far exceeds in quality the rote-like instruction these children commonly encounter in schools" (Moll et al., 1992, p. 132). Letting students use their home knowledge or funds of knowledge in the classroom allow them to learn based on their interest and motivate them to question more facts, and it will "reduce the insularity of classrooms and contribute to the academic content and lessons" (Moll et al., 1992, p. 139).

Mensah (nd) argued that despite each student's background, they deserve an equity learning experience. Thus, in teaching-learning science, teachers should acknowledge that students have unique backgrounds and experiences that must be treated wisely. By considering students'

cultural backgrounds in the classroom, the teachers will support student science content knowledge and engagement appropriately.

If teachers fail to connect students' cultural backgrounds and science, it may corrode students' interest in science and learning the scientific process as they cannot relate science to their lives. This idea was argued by Reis that "such curriculum and pedagogy endorse the view that knowledge is socially constructed and context-dependent and represent approaches to learning and teaching that utilizes sociocultural referents to construct knowledge, skills, and attitudes that empower people intellectually, socially, emotionally and politically"(2015, pp. 233). Undoubtedly, the school needs to develop more social-cultural-oriented teaching strategies to increase scientific knowledge.

Including students' social and cultural experiences into the classroom gives students more opportunities to engage with science theory and make sense of coherence and correlation. They can feel the essence of understanding the "real world" through science and praising and accepting science as much as their culture. Students can differentiate themselves as part of the science and socio-culture communities and know how to behave in each community without underestimating or ignoring each.

Lemke (2001) reported that "a sociocultural perspective on science education is skeptical and critical" (p. 297), where people sometimes question the explanation behind a phenomenon that contradicts local beliefs or local experiences (Tobin, 2015). When students realize their identity as individuals, teachers must admit that they might respond differently to the scientific approach that encourages teachers to be aware of using different approaches in teaching science (Adinugraha, 2022; Lemke, 2001; Moll et al., 1992). Sociocultural insights also become the root of organizing the heterogeneous classroom community in terms of its methods, strategies, and curriculum despite gender biases (Adinugraha, 2022; Kelly et al., 1993; Ladson-Billings, 1995a; Mensah, nd; Reis, 2015). The key to the issues of different sociocultural perspectives suggests that teachers should be flexible and adaptable in providing alternative ways for students to integrate their everyday phenomena with science concepts. It is because "science knowledge can certainly add to the aesthetics of everyday life as evidenced in activities" (Tobin, 2015, p. 3).

Students sometimes feel irrelevant to the material being taught in the classroom as some science concepts might be unrelated to their experience and represent more foreign culture. Cultural clashes in several places due to the differences between western science and students' indigenous culture emerge "the need to establish culturally sensitive curricula and teaching methods that reduce the foreignness felt by students" (Aikendhead & Jegede, 1999, p. 269). Therefore, a new curriculum and relevant pedagogy are needed so that students can apply scientific theories and facts as an alternative solution to solving societal problems. Indigenous knowledge could be a rich resource in establishing a curriculum and pedagogy relevant to students' lives (Zidny, 2022). Consequently, it develops balance and holistic acculturation, and intercultural understanding.

One pedagogy that has a similar goal is Culturally Relevant Pedagogy. Ladson-Billings created Culturally Relevant Pedagogy to provide a similar learning experience for African American

students. This pedagogy empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes. CRP has three criteria: academic success, cultural competencies, and critical consciousness. To succeed in academics, teachers should encourage students to improve their self-esteem by developing equal power and each student's role in the learning process. Besides being excellent academically, students should develop their cultural integrity. In order to achieve that, the teacher should "utilize students' culture as a vehicle for learning" (Ladson-Billings, 1995a, p.161), for example, letting the students express themselves through their music, arts, or language in engaging with a class activity. The last one is critical consciousness, where students should be able to grow their understanding and sensibility of sociopolitical issues happening in their community.

Teachers with culturally relevant perspectives believe they are responsible for guaranteeing students' success, encouraging them to work collaboratively, and positioning themselves as a part of the community that has to contribute to the community. Teachers should first have a conversation with students to build a concrete experience that helps them access knowledge claims (Ladson-Billings, 1995b). Another thing is that "teacher should be encouraged to ask about the nature of the student-teacher relationship, the curriculum, schooling, and society" (Ladson-Billings, 1995b, p. 483). Based on Mensah (nd), by knowing the students through formal or informal opportunities, teachers can collect information about students' background and their concerns about their community. This information will be helpful for community-based science knowledge practice, project-based learning, and arranging collaborative learning.

It is essential to create activities that support students to incorporate science as their resource and knowledge to solve their daily problems and explain world issues, besides growing their cognitive development. Students can use their sociocultural experience and bridge it into a science context or vice versa, which helps them to literate themselves on the links between reading, writing, and understanding culture and science. This connects to what has been reported by Aikenhead & Jegede (1999) about students' abilities to connect science and real life. They mentioned Costa's classification, namely “Potential Scientists” who smoothly transition between science and real life, “Outsiders” who have limitations in successfully learning science as they have a gap between school science and their culture, “I Do Not Know Students” who tend to fail in the science classroom as they refuse to assimilate to science-culture, and the last is “Other Smart Kids” who consisted of students who value their cultures while consider science is irrelevant to their lives. When the students have a conducive learning environment, it can improve the longevity of students' knowledge memorization and its application.

2) Science and Culture Integration in the US

The Next Generation Science Standards (NGSS) and other US science frameworks and standards emphasize promoting sociocultural understanding in the science learning process. It is essential to "validate and incorporate students' linguistic and cultural repertoires in classroom instruction through multimodal and open-ended learning tasks" (Buxton et al., 2019, p. 978). This fact is due to the influence of sociocultural context on one's sense-making and response.

Buxton et al. (2019) argued that students should be allowed to do scientific reasoning and communication using their more comfortable spoken language and writing their arguments. Regarding the assessment also proposed by Buxton et al., it is better to start the text or illustration by providing concrete contexts close to students' sociocultural background; it can then be followed by more condensed and symbolic language. In addition, the teacher in their assessment can provide bilingual text to support their student.

There is a mantra in NGSS that says "all children can learn" or "science for all," which encouraged many researchers to attempt to actualize that mantra. Lee & Fradd (1998) inspired to help Non- English Language Background (NELB) by considering students' language and cultural backgrounds in their learning process. To address the disparity that NELB might encounter, teachers can use instructional congruence by mediating the nature of academic content with students' language and cultural experiences to make such content accessible, meaningful, and relevant to diverse students" (Lee & Fradd, 1998, p. 12). It resonates with Lee & Buxton (2011) that classified students in the US context into mainstream and nonmainstream students and that there is a gap between the two groups. Mainstream students are Whites, having a high-income background and native English speakers, and nonmainstream students are Non-Whites, having a low-income background and non-native English speakers. Thus, Lee & Buxton (2011) attempted to incorporate the nonmainstream cultural and linguistic experience. "By incorporating nonmainstream students' cultural and linguistic experiences in teaching science, equitable science learning opportunities may enhance their engagement in science, motivation to learn, participation in science, motivation in active inquiry, understanding of rigorous science content, science achievement, and development of identities as successful science learners (p. 278).

There are three theoretical perspectives: cognitively based, cross-cultural, and sociopolitical, that can be chosen and applied based on the condition and situation of the classroom. From the cognitively based perspective, every student brings their experience from home and their community into the science classroom, so they probably have diverse linguistic and cultural resources in their sense-making process. Thus, nonmainstream students could use their everyday words in reasoning, problem-solving, inquiry, and argumentation (Lee & Fradd,1998; Lee & Buxton, 2011). From a cross-cultural perspective, students from some cultural communities have different cultural contexts, beliefs, and communication systems that contradict Western science. Thus, the teaching-learning practice should apply the instructional congruence that supports students' utilizing their science and cultural knowledge to enable them to shift from the science and cultural systems (Lee & Buxton, 2011). From a sociopolitical perspective, the mainstream usually has power, prestige, and privilege while nonmainstream struggles. Thus, the teaching- learning process should create a relevant situation and consider nonmainstream experiences in social, cultural, and political conditions (Lee & Buxton, 2011).

3) Science and Culture Integration in Indonesia

In the Indonesian curriculum 2013, the integration of science and culture in students' handbooks is not covered (Aisyah et al., 2020). The ideas started to be introduced explicitly in the newest curriculum, Merdeka Curriculum, where the local social-cultural phenomena are being utilized as a resource to embed in the learning material in science class. Based on

research conducted by Indonesian researchers generally shows that many teachers still cannot integrate culture and

science. It results in students' lack of understanding of their identity, lack of interest in science, and low science achievement; also, they less value their indigenous culture. To address that condition, researchers introduced culture-integrated science learning based on culture-based learning to increase students' scientific and cultural knowledge, enabling them to solve community problems utilizing their science abilities (Kasi et al., 2022; Zubaidah & Arsih, 2021; Soko et al., 2017). Integrating and promoting culture, local wisdom, technology, and the arts related to students' daily experiences has been proved encouraging students' curiosity and abilities in science learning.

Zubaidah & Arsih (2021) introduced three ways to integrate culture into science: general learning, embedded learning, and mixed learning. Presented in their report, the application of three different ways have successfully increase student learning motivation and interest in learning science and positively affect the learning achievement. In the "general learning" approach, teachers use local phenomena, events, or resources in Problem Based Learning. For example, apply local ways of discussion to reach a mutual agreement in science discussion. Another example was introduced by Kasi et al. (2022) using Ndai, a hunting activity in Nagekeo where people burn the hunting area before the hunting process, which can be used for learning about biodiversity and human activities' impact on the environment. In "embedded learning", teachers can introduce some cultural values into learning material. It is because more Western culture has been adopted into science learning, which results in a gap between scientific and indigenous science. One way to apply this approach is by developing culture-integrated modules or publishing/writing culture-integrated textbooks.

In "mixed learning", ethnoscience is the way to implement science combined with indigenous science. Here are some examples of the integration of local science or indigenous knowledge as resources for students in science teaching-learning. In the measurement topic, students can use local ways such as Ha depa/Ha Repa means one hand, Ha Pangge means 1(one) foot to measure the unit of length, and Mboda (a woven palm leaf) to measure the volume. In addition, teachers can use Dhongi Koti, a toy made from kesambi wood or guava wood used in the etu ritual or traditional boxing in Nagekeo, to learn about Newton's law. A traditional house and a traditional musical instrument can also be used in learning about physics. Other researchers, Soko and team (2017), also introduced some implementation of local science in physics, for example, Endenese, Sikkanese, Mangarainese, and Alornese use different terms to measure length. In learning about Newton's Laws and their applications, the authors mentioned the Pasola tradition, the thanksgiving ceremony in West Sumba and Kela Koti, the traditional spinning top in Endenese, and many more. Regarding temperature, heat, and heat transfer, the author introduced Tatobi, a smoke tradition for post-partum medication in Timornese, and the process of making Moke, a traditional alcoholic beverage from Ngadanese. Teachers can also use Sasando, traditional Rote Island music, to teach about sound waves.

In the application, teachers should consider "to contrast conventional science as taught in schools with the knowledge/beliefs/skills in traditional settings and to present examples of

incongruity or miracle (discrepant event) to the students which are commonplace in the scientific concept" (p. 229). By doing that, teachers could activate students' critical thinking to think actively and critically. The result would be the students' positive attitudes in science and culture and learning comprehension or sustainable knowledge.

Alternative of Teaching Science by Integrating Social-cultural Aspects

Based on the review, the author proposes some possible way to integrate local terms into science, takes biology as the representative, is by allowing students to use their local language of animals and plants or phenomena that happened in their community.

For example, Indigofera amblyanthan, in the Indonesian language termed Nila or tarum, has different names in different islands of Indonesia (Figure 1). Therefore, in teaching students in Roti Island, the teacher should allow the students to use the name tau or tauk. Another example is when students need to mention Chromolaena odorata, or in the Indonesian language called balakacida, students in Timor Island would be more familiar when the teachers use the name suf muti (Figure 2). This example shows that in teaching about plants and their function, teachers should be more flexible and open to acknowledging that students might have a different name that they are familiar with in their everyday life. In the local community, those two plants are essential in cultural life as tarum well-known as a natural dye for traditional woven clothes, and the balakacida is for traditional medication.

Island	Indigo Plant
Bahasa Indonesia	nila or tarum
Aceh	tarom
Batak	tayom
Minangkabau	pulasan
Sunda	tarum
Java	etom or tom
Bali	taum
Lombok	tarum
Sumbawa Bima	dau
Ende	tarung
Sikka	tarung
Lembata Ile Api	tao or taum
Lembata Ata Dei	taum
Lembata Lamalera	tao
West Timor (Atoin)	taum or talung
Kisar Meher	karung
Kisar Oirata	tarum
Roti	tau or tauk
Savu	dao
East Sumba	wora
West Sumba, Kodi	kanabu
Yamdena	katiawel
Fordata	takja
Ternate	tom

Figure 1. Indigo plant (Indigofera amblyanthan) names in different islands of Indonesia

Figure 2. Balakacida (Chromolaena odorata)

In teaching about plants or animals' organs, cells and tissues, the author is inspired by kasi et al. (2022) ideas in teaching about the heat in physics class using the traditional phenomenon where people in nagekeo use reeds as roofs in building a traditional house. That makes the traditional house warm during cold weather. In biology, this phenomenon can be used to introduce parenchyma tissues in the plant that can trap the air and gas in the cells and maintain the indoor temperature. Apart from that, in nagekeo and timor, there is a forest burning phenomenon. Nagekeo has the ndai tradition, a hunting activity where people burn the hunting area before the hunting process (kasi et al., 2022), while in timor, people burn the forest for cultivating corps purposes which can be used for learning about biodiversity and human activities that impact on the environment.

When soko et al. (2017) introduced sasando (figure 3), a traditional music instrumental from roti island, the author is inspired to use traditional instrumental such as likurai from timor island to introduce the students to plants and animals' organs and tissues as well. Sasando is made from lontar (borassus flabellifer) leaves and bamboo stems. The teacher can prompt questions such as "why, in making a sasando should people use lontar and bamboo and cannot use other plants?". This is an example of bringing students fund of knowledge and culreal phenomena to be the anchor as well as use a real cultural aspect into problem based learning process. This question can increase students' curiosity, and they will be eager to investigate their culture from a scientific perspective.

Figure 3.Sasando, a Roti Island instrumental using lontar leaf and bamboo

Other than that, teacher can use *likurai* (**Figure 4**) as an example, it can be used as an anchoring phenomenon in introducing animals' tissue or cambium tissue, giving a question such as "why *likurai* with cow skin sounds more melodious than using goat skin?" or "why do people use red teak in making *likurai* and not use bamboo or other hollow wood?" Incorporating cultural elementsin biology learning can trigger students' curiosity and interest to study biology more deeply because they can find a correlation between culture and science in their learning process. It increases students' knowledge of science and their awareness of their local culture.

Figure 4. Likurai, a Timor Island instrumental using cow skin and red teak

As Soko et al. (2017) mentioned *Moke*, a traditional alcoholic beverage to teach physics, it inspiredthe author to *Sopi* or *Laru* or *Anggur Pisang*, a Timornese alcoholic beverage, to teach about fermentation, distillation, or addictive substances. *Sopi* and *Laru* (**Figure 5**) are made from the fermentation of *lontar* milk using local herbs and plants. Sometimes, people use distillation to distill *lontar* milk to become purer to get *sopi nakaf* (**Figure 6**). Banana wine or *Anggur Pisang* (**Figure 7**) is similar to wine but is made from fermenting bananas. Including these local aspects into biology classroom, teacher can use learning project based on learning the topic of fermentationand addictive substances. Teachers can also use the phenomena related to those alcoholic beverages as anchoring or case studies in problem-based learning.

Figure 5. Sopi or Laru

Figure 6. Sopi nakaf


Figure 7. Anggur Pisang

In addition to those alternatives, referring to author's experiences, many local traditions or eventscan be used in biology class to increase student acknowledgement of the relationship between science and culture. Mentioned as an example is that the beliefs of some tribes that they are not allowed to eat cucumbers or "*pamali*". People in these tribes believe that this condition is inherited by the ancestor and must be adhered through the generation. Scientifically, it is due to a genetic allergic reaction. However, people in these tribes believe that allergic reactions are due to being cursed by their ancestors. It is that science has its explanation that the chemical composition or biomolecule in the cucumber has the allergen. Teachers can use such phenomena as a case study for problem-based learning or as anchoring and example in teaching-related topics.

CONCLUSION

Based on the theories and the examples presented, the author believes that there are several approaches and alternatives to connect students' social-cultural aspects, particularly language andlife experience and their science learning process. Integrating students' local language and social-cultural events in science classrooms show that this strategy will likely positively increase students'interest in science as science is a part of their everyday lives. In addition, students do

not feel "thedistance" from science as science is no longer foreign in terms of its terminologies. Science is notstanding separately from culture; culture is interconnected to science in some ways. Having students' motivation and interest in learning science higher opens more opportunities to increase students' scientific literacy. One thing to be considered is how the teachers should be creative withtheir teaching pedagogy and instruction to incorporate local terms and social-cultural phenomena successfully and effectively in the science teaching-learning process.

ACKNOWLEDGMENTS

In this literature review, the writer's heartfelt gratitude extends to the Almighty God who blessed the author with health and patience to finish the journal. This journal was inspired by the situation that the author encountered during the first year of teaching professionally, which would not have been possible if there had not been an opportunity to join the Fides Community. As this journal is financially supported by the author and through literature review, in general, the author thanks the colleagues, the librarians, the family, and friends. They have provided incredible support during the process of completing this journal in different ways. With hope this journal aims to provide information related to science and culture that can be used widely and wisely by the readers to be implemented in their community as with hope that will improve science interest and scientific literacy.

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