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Elaborating Indigenous Knowledge in the Science Curriculum for the Cultural Sustainability

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Abstract

Indigenous knowledge has been contrasted and compared with scientific knowledge as traditional versus modern. This becomes the main problem for the native learners who feel separated from their environment. They face the challenge of existing in a couple of worlds indigenous and non-indigenous. The research presents the theoretical viewpoints of science education and indigenous knowledge to provide a new perspective on science learning. Data are gathered through the original document analysis of indigenous communities of Javanese people and science syllabi. The results of the study propose four steps to integrate indigenous knowledge in the science curricula: fragmented, connected, sequenced, and integrated. This study indicates that indigenous knowledge incorporated in the science curricula includes attitude, knowledge, and skill aspects. It establishes a significant connection between what pupils encounter in the school and their lives beyond the school for the cultural sustainability. Elaborating indigenous knowledge in the science classroom is potential for building meaningful learning and connecting the gap of science education pathways that a student obtains in schools and community.

Keywords: indigenous knowledge, science curricula, cultural sustainability.

Introduction

Indigenous knowledge has been ignored and dismissed from science curricula for several years. It may be seen to be at odds and limits of scientific knowledge. Some people also consider indigenous knowledge should not be given since it will prevent the non-indigenous community (Aikenhead & Ogawa, 2007). The current science curriculum is a representation of Western worldviews that seldom forget social activity in the real-life environment and might be alien to some of the pupils (De Beer & Whitlock, 2009). This problem has an impact on the imbalances in societies where cultural values and local wisdom are abandoned. There is an also even alienation to the knowledge itself. This further influences the moral, social, cultural, and natural crisis that has

caused the humanitarian crisis (Herusatoto, 2012; McInnes, 2017). The current difference in global development to the unsustainable patterns of behaviour increases the question of whether the root of pedagogy is not drawn back to the philosophy as a unified body (Fedosejeva, Boče, Romanova, Iliško, & Ivanova, 2018).

In recent years, a requirement for a holistic understanding of sustainability aspect has regularly appeared, resulting as a need and condition for determining a current perspective education (Fedosejeva et al., 2018). The increase of awareness of the indigenous sustainability is filled by enthusiasm for nature conservation, social justice and the development of science in classes based on the cultural identity. Aikenhead and Ogawa (2007) stated the reasons that stimulated the native research: the scholars would like to develop the containing domain of science, a chance to improve the supremacy and cultural continuation of indigenous people. They would like to raise a number of educators who are aware of the cultural impact on learners' science achievement. Education is not only strongly tied to formal schooling but also is a comprehensive process. People must learn, observe, remember, and develop a social, moral, and emotional response to their circumstances (Herusatoto, 2012; McInnes, 2017). The fact that happens is pupils that represent different cultures, gender, education, age, community, interests (Guest, 2002); they bring various ideas in the classroom based on their expertise and based on diverse backgrounds that also frequently represent different science concepts. Their mind is full of experience and knowledge. The pupil's consciousness has evolved through the process of assimilation and accommodation known as preconceptions, which have not been realised (Mestre & Touger, 1989). Learning should emphasise how to begin a lesson based on students' previous knowledge and experience. Everything that the learner has experienced or thought can be a source of scientific knowledge. They should be encouraged to strengthen their cultural identities and be interpreted in a practice that is meaningful.

In the context of education, the most efficient way of strengthening indigenous knowledge is integrating the knowledge into school science (Aikenhead, 2006; Meyer & Crawford, 2011; Regmi & Fleming, 2012; Zinyeka, 2013; Zinyeka, Onwu, & Braun, 2016). It is a challenge for educators and researchers to promote lessons and curricula to stay in synergy with the demands of the times without having to abandon local values. Teachers need to recognise that the indigenous knowledge and classroom scientific knowledge can synchronise and be support for each other (Regmi & Fleming, 2012). The addition of indigenous knowledge in the curricula is an essential element of contemporary science education. Indigenising curriculum refers to the integrating of indigenous knowledge into the school science curriculum (Moyo & Kizito, 2014), incorporating an audible "native voice" (Acton, Salter, Lenoy, & Stevenson, 2017). The introduction of indigenous knowledge into science school might present science more appropriate for a student in the culturally different classroom (De Beer & Whitlock, 2009), could have a definite impact on students' enthusiasm in science (Kasanda et al., 2005), and help them appreciate as well as maintain alive the native knowledge (Ng'asike, 2011). Indigenous knowledge brings affordances for conceptual improvement of pupils in the science school since this cultural knowledge frequently supports the formal curriculum idea adequately (Cronje, de Beer, & Ankiewicz, 2015).

Theoretical Framework

School Science

Science is a way of knowing about the phenomena that occur in nature by using methods and ways of systematic thinking (Howe, 2002). It is an objective perceiving reality. Science refers to conceptual constructs established by rational empiricism behind the realm of observation and experiment (Snively & Corsiglia, 2000). Chiappetta and Koballa (2009) are convinced that science is a systematic effort to create, construct, and organise knowledge of natural phenomena that begin from the human nature of curiosity, which is then followed up by an inquiry to investigate the most straightforward and consistent explanations and predictions of the phenomena. Science is regarded with testable phenomena and studies the universe as knowable (Ogunniyi, 2011). Science is essential and it includes: (1) a process: an inquiry procedure that includes real phenomena; (2) products: facts, concepts, principles, laws, and theories that interpret and predict the phenomena; (3) attitude: curiosity about nature that is studied within persistent, honest, and openness to new opportunities (Lawson, 1995).

Science does not only consist of facts, laws, and theories, but also involves human activities, such as investigations, processes, attitudes, and beliefs. Science in the domain of knowledge must be factual, conceptual, procedural, and metacognitive (Krathwohl, 2002; Suwarto, 2010). Factual knowledge is an essential component that pupils must recognise by the discipline. The core elements are given following academic science, which is easy to understand and systematically arranged. Conceptual knowledge connects, associates, and combines different essential elements in a systematic and shared common structure. This knowledge can be a scheme, mental model, or explicit and implicit theories in different cognitive psychology. Procedural knowledge emphasises how to make discovery and sets criteria for the use of skills, algorithms, techniques, and methods collectively. Metacognition implies awareness, and responsibility for one's own learning and thinking. Sandoval and Reiser (2004) explain that the epistemology of science comprises not only sources of scientific knowledge and the value utilised to sustain that knowledge, but also the way of knowing handled by the community to accept scientific knowledge.

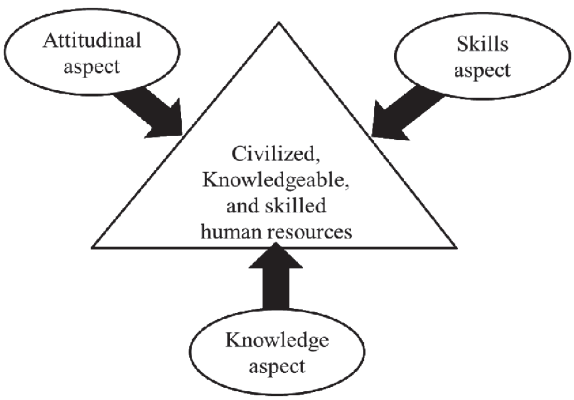

Figure 1. Scientific competencies for school science.

The orientation of science curriculum in Indonesia will be interpreted in educational practices with the specific purpose of enabling learners to have fundamental skills for

the careers of today and in the future. In the science curriculum, the scientific competencies that must be completed by primary students involve (1) fostering religious attitudes and high social ethics in the life of society, the nation, and the state; (2) mastering of knowledge; (3) obtaining the skills or ability to apply knowledge to conduct scientific inquiry, problem-solving, and creative work related to daily life.

Indigenous Knowledge

Indigenous knowledge is a comprehensive knowledge that incorporates technologies and practices that have been used by native people for their continuation, survival, and adaptation in a change of environment (Kasanda et al., 2005; Onwu & Mosimege, 2004). Battiste (2002, p. 2) emphasised the holistic nature of indigenous knowledge and proposed that native knowledge should contain the complex set of technologies improved and sustained by the indigenous community. Ogawa (1995) defines indigenous knowledge as "cultural-dependent collective intellectual perceiving of reality" where collective means to be held in an adequately similar form by people to provide effective communication, but independent of a particular mind. All people involved in indigenous knowledge from moderate to high levels in a community are experts. They are actors of their knowledge. Indigenous knowledge is manifested in practices and communicated orally, and at times through copying, illustration, painting, and other artifacts (Zinyeka et al., 2016). The pattern of indigenous knowledge is like the collective thinking of a place or region based on natural phenomena that incorporate human and non-human thought integration, such as the scientific knowledge rooted in the local culture (Alessa et al., 2016). Indigenous knowledge relates to "the people" cognitive and wise legacy as a consequence of their interaction with nature in common region (Hart, 2010). The ethnographical background of indigenous knowledge reveals compromised efforts, strengths, and preservation in a day to day continuation and generation of experimental living with nature (Chandra, 2014). It provides the foundational teaching and lessons on how people are linked to the rest of the life.

Indigenous science describes how the local environment runs through a scientific process that includes objective observation of natural phenomena and classifies as well as solves problems that are encompassed in all perspectives of native culture (Snively & Corsiglia, 2000). Characteristics of indigenous science combine local development and application, such as testing hypotheses, experiments, and problem-solving related to the sociocultural dynamics. The body of knowledge, equivalent to the peer-reviewed study, consists of a continuous living awareness of the nature such as agriculture, architecture, mathematics, climatology or climate change, astrology, medicine, plant varieties, etc. (Alessa et al., 2016; Kasanda et al., 2005; Onwu & Mosimege, 2004). Indigenous knowledge is both factual and the existing practice of indigenous people needed for survival and adaptation in diverse conditions through natural and socio-cultural synergies with the environment (Regmi & Fleming, 2012). Although the factual knowledge and practical knowledge are different, they both influence one another.

Cultural Sustainability

Culture is central to awareness of sustainability in the native community, underlying and pervading the whole aspect of life (Throsby & Petetskaya, 2016). Culture is often reduced to unified or essentialised abstraction that seeks to explain the term through finite approaches that create neither diverse nor complex notions of "culture" (Acton et al., 2017). UNESCO (2009) defines culture as the whole complex of distinctive spiritual, material, intellectual and emotional features that characterise a society or social group, not limited to the arts and letters, and including modes of life, the fundamental rights of the human being, value systems, traditions, and beliefs. Sustainability principles are central to the culture of the world's native people and cannot be neglected in any consideration of charming development paths that their populations have sustained for countless ages (Throsby & Petetskaya, 2016; Van den Branden, 2012).

Cultural sustainability refers to the ability to preserve cultural identity and to enable change to be conducted in ways that are harmonious with the cultural values (Finlayson, 2015). This emphasises the sense of progressive understandings of culture and recognises that society is necessary. Acton et al. (2017) describe cultural sustainability as enabling inter-and intra-generational access to cultural resources. The theoretical background for cultural sustainability begins from the close parallels between natural and cultural capital. Natural capital covers natural resources, ecosystem, and biodiversity, while cultural capital holds cultural property (tangible and intangible), cultural networks and support system, and cultural diversity (Throsby & Petetskaya, 2016). Material parts cover monuments of architectural, sculptural, painted, archeological and human-made landscape, while immaterial parts include practices, designs, illustrations, attitude, knowledge, and skills (Axelsson et al., 2013; UNESCO, 2003, 2009). Cultural sustainability arranges with a comprehensive definition of sustainable development to suffice immediate demands without compromising the needs of the future generation (United Nations, 1987), including encouraging commitment to and conservation of cultural heritage. In other words, sustainable development does not pose risk to the natural systems that sustain the life of the indigenous community. It is necessary to explore the linkage between sustainable development and indigenous knowledge. Sustainable development is frequently recognised with the environmental issues (Burns, 2015). In this study, we only emphasise immaterial cultural heritage, attitude, skills, knowledge as well as fundamental science competencies.

Method

The research question is as follows: How to elaborate indigenous knowledge and school science in the science curriculum for the cultural sustainability? The present study focuses on the possibilities to elaborate indigenous knowledge into the science curriculum. Data were collected through Javanese original knowledge documents from the Reksa Pustaka Pura Mangkunegaran, Radya Pustaka Museum, and Indonesia science syllabus in primary school. These sources provide valuable data to help researchers understand central phenomena in a qualitative study, particularly for document analysis (Creswell, 2012). The authors are engaged in work with the Javanese community as part of the indigenous methodology. The indigenous methodology is a body of indigenous and theoretical approaches and methods, rules, and postulates employed by indigenous research (Porsanger, 2004). The aim of this methodology is to assure that research on

native issues can be carried out further considering the ethical way from the viewpoint of Javanese native people.

The qualitative data were organised into a file folder since of a significant amount of information gathered during the study. The data were analysed in detail to answer the qualitative research question. During data analysis, the researchers identified the signed documents that provided useful information about indigenous knowledge in the Javanese native communities that is of particular relevance to the research being studied. The significant information was then organised and interpreted by creating a comparison table. The researchers also explored the data and developed codes to obtain a general sense of data and consider whether they needed more data. The analysis technique at this stage was implemented using visual content analysis, which was a process of identifiers and calculating events, characteristics, and other phenomena in visual data (Johnson & Christensen, 2013; Creswell, 2012).

Findings

Science education research provides evidence for the cultures of science, school, and students may or may not gather in the space of school science learning in the diverse field. Curriculum integration is required to enrich learning and to connect information learned. Educators should reflect elaboration as a potential tool that can link various knowledge disciplines. In this study, we proposed four steps to integrate indigenous knowledge in the science curricula. These steps were adapted from Fogarty (1991): fragmented, connected, sequenced, and integrated (Figure 2).

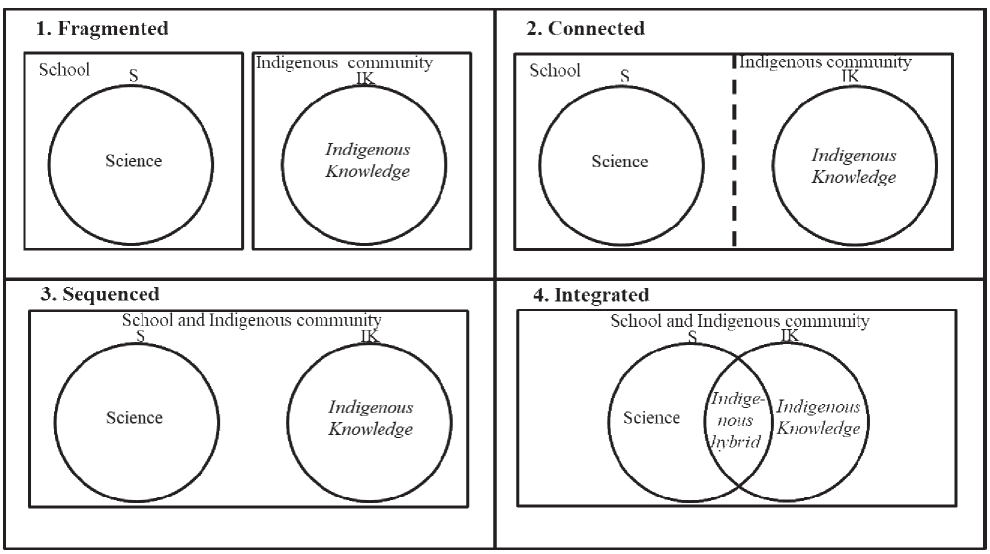

Figure 2. Elaborating process indigenous knowledge into science curricula

1. Fragmented

Indigenous knowledge and classroom science were studied independently in the isolated system. It was arranged to dictate distinct disciplines. Each knowledge area is considered to be independent as a real entity in and of itself. Indigenous knowledge was

a complicate and comprehensive subject when compared to school science. The aim of this fragmented step was that the sincerity of each knowledge area was left untainted.

2. Connected

The results of the analysis of each knowledge area in the fragmented step were explicitly connected based on each subject area, topic, concept, skill, and other schemes. The arrangement between the pair of knowledge started to penetrate (dashed line). The breadth of indigenous knowledge required accurate identification and analysis. This process resembled the osmosis process, where the concentration of indigenous knowledge was greater than the norm science school. The key to this step was the attempt to correlate indigenous knowledge within a discipline deliberately. By connecting within a discipline, it will perceive the big picture as well as a focused study allowing one to review, reconceptualize, and assimilate ideas.

3. Sequenced

The next step aligned the two areas of knowledge. This alignment aimed at examining the relationship between the two knowledge areas more deeply and in detail, where the universe of indigenous knowledge and science classroom were linked and correlated to one another. The key of this stage was to arrange the topics, concepts, chapters, and skills that were similar between the two knowledge areas. The universe was fused within the school and the native community. This part emphasized a critical decision about the subjects and content areas.

4. Integrated

The integrated step blended the primary aspect of setting curricular preferences in each knowledge area and finding the overlapping skill, knowledge, and attitude. The integration resulted in shifting ideas out of subject matter content as commonalities emerged. The integrated model led to the interconnectedness and interrelationships between both knowledge areas. Additionally, it built understanding across disciplines and fostered appreciation of expertise. Both pieces of knowledge were integrated regarding the rightness of graduates' competencies and competencies that must be achieved by students (Table 1).

Table 1
Differences and Similarities between Science Classes and Javanese Indigenous Knowledge

Scientific competencies	Differences		Similarities
	Science classes	Javanese indigenous knowledge	
Attitude and social ethics	• Nature was explored, utilised, and explained scientifically • Emphasised the strength of the empirical evidence • Opened mindedness • Dismantling the mystery • Objective and formal	• Nature was part of life • Emphasised on partial empirical strength and partly metaphysical • Narrow and closed mindedness • The mystery was harmonization • Subjective and informal	Honest, Creative, Tolerant, Caring, Persevere, Cooperation, Responsible, Curiosity, Respect, Conscientious

Sequel to Table 1 see on the next page.

Sequel to Table 1.

Skills/ procedure	• Observation was arranged by measurement using instruments • Data and evidence were collected quantitatively, qualitatively, and using a mix of methods • Results were communicated orally and in writing • Predictions were made based on data and empirical evidence • Generally recognised • Linear thinking	• Observation was arranged by reading the signs of nature and experience • Data and evidence were obtained qualitatively • Results were communicated orally • Predictions were made based on natural signs and beliefs • Locally recognised • Circular thinking	Observing, Collecting data, Communicating, Decision making, Critical thinking, Predicting, Verifying, Analysing, Evaluating, Comparing, Grouping, Setting the pattern
Mastering of knowledge	• Separate by discipline • Studied for the needs of economy and politics	• United and integrated with other knowledge areas and applied in everyday life as a way of life and beliefs • Studied for cultural and natural preservation	Technology, Art, Culture, Natural sciences, Mathematics, Agriculture, Medicine

Initial similarities between both pieces of knowledge are fundamentally normative. They both propose values and behaviour norm consideration, in some sense an idealized appearance of the world. In the science development issue, it is necessary to discuss the issue of implementing the knowledge structure and classification method that is relevant to the contexts concerning educational sustainability. Classification is applied to recognise the potential for integration among various knowledge areas by looking at the issue (Salīte et al., 2016). This integration is one of the ideas to make indigenous knowledge more accessible, by presenting a curriculum in a way that recognises and utilises a particular peoples' way of conceptualising natural phenomena in the students' circumstances. Integration of both pieces of knowledge is the requirement of a safe space for students to explore the culture interface that is complex.

Furthermore, researchers analysed the different perspectives on learning and teaching between school science and indigenous knowledge (Table 2).

Table 2
Differences in Learning Instruction Aspects between Science Classroom and Javanese Native Science

Learning spect	Science classes	Javanese indigenous knowledge
Learning Method	• Learning was performed at the school in a relatively fast way • Examples were provided through the concept • Learning and instruction were given by the didactic methods	• Learning was carried out in the community and nature for a long time even for life • Examples were provided through behaviour

Sequel to Table 2 see on the next page.

Sequel to Table 1.

	• The learning process was carried out referring to Bloom's taxonomy ranging from memorizing to creating • Knowledge was transmitted orally, in writing, and mathematics	• Learning was carried out using 3M methods, *Momot* (loading), *Momong* (caring and loving) and *Momor* (fused) • The learning process was carried out by the 3N system, *Nyinau* (learning), *Nggagas* (understanding), *Nyipta* (creating) • Knowledge was conveyed orally
Learning Media	• Learning resources were books, computers, experiments • Use of visual media, audio, audio-visual, project motion, and aids	• Learning resources were nature, society, and experience • Use of visual media (symbols, *wayang*, reliefs, sculptures)
Assessment	• Assessments were carried out to achieve learning objectives • Achievement was evaluated through tests and exams	• Assessment was hard since the goal was to improve life • It was challenging to evaluate achievement in the form of life experiences

Discussion

Native people serve the demands of the behavioural and attitudinal act. Javanese traditional notions provide complete moral and ethical learning about nature and human behaviour. It covers various things that serve as a source to explore the philosophy and belief (Endraswara, 2006). The dominant characteristic behaviours tend to be quiet and mutually respective. The knowledge teaches the Javanese people to appreciate nature with a good sense and mind to fulfill the necessities of life. Native knowledge is deeply rooted in connection with the environment as well as in cohesion (Magni, 2017). Integrating indigenous knowledge into science curricula gives the learners the opportunity to think about the support of life and preserve from over-exploitation of nature. Studying indigenous knowledge allows the student to maintain a sustainable use and control of natural resources to protect the ecosystem and improve its resilience. The knowledge guides students to be engaged and critical of socio-cultural problems. Indigenous knowledge can support proper resource management and make students responsible, communicative and express a caring manner about the human rights of native people, classical culture, and human intellectual capital. The student's ability to observe and adapt has helped indigenous people to face a different and complex circumstance that influences their way of existence and regions. Indigenous knowledge extends strategies and thinking that consider what, how, and when the approach is adequately applied (Aikenhead & Ogawa, 2007).

Indigenous knowledge contains experience that continues from generation to generation. It can be history, myth, legend, culture, art, music, speech, language, writing, scientific discoveries, social networking, and life skills (Ahimsa, 2012; Jacob et al., 2015). Cajete (2000) reported that indigenous knowledge blended within the spiritual and metaphysical indigenous knowledge expressed in the figures, places, and actions, using symbols, art, stories, song, metaphors, proverbs, unique objects, and structures to share the culture. The knowledge is highly contextual and directly related to the life of

native people such as the knowledge of horoscopes in astrology (Pawukon), and a season calendar that is still used by farmers and fishers (Pranatamangsa). The knowledge is concerned with the science and compliant technology. Integrating indigenous knowledge into science curricula makes it possible to apply common strategies of thinking and problem-solving.

Indigenous people play a vital role in safeguarding and preserving processes in nature, and their behaviour declared in a ritual or belief. In this case, it cannot be seen that education only occurred in the field of formal schooling, which is restricted to the classroom but incorporates the whole of nature and all its phenomena. Considering localized and nuanced understanding of indigenousness and indigenous knowledge is the key factor in ensuring cultural sustainability. The cultural sustainability can be achieved by assuring that indigenous people share their experiences in their subject. Respect for an acknowledgment of a highly situated consciousness relates to the necessity of embedding plural ways of knowing (Acton et al., 2017). Every culture influences the ecosystem and local knowledge. It is the responsibility of the communities around the areas (Retnowati et al., 2014). Cultural adaptation is expected to overcome the interface between indigenous knowledge and scientific knowledge aligned and in harmony with recent developments; it is not enough to inherit, preserve and save it, but rather it is necessary to restructure the culture. Natural harmonization is a characteristic of the traditional culture. Nature is a home where humans become part and continuously interact with it.

A culturally studied science curriculum purposes to develop social and cultural knowledge as part of the educational process (Stephens, 2000). It has to work with conferring science in the body of knowledge by strengthening that science rules can be integrated in the learning process (Retnowati et al., 2014; Stephens, 2000). Native knowledge carries components of the science disciplines available to a pre-modern culture, as well as explanatory narratives on natural systems, which flagrantly contradict the fundamental of science. (McKinley & Stewart, 2012). It has to be obtained by finding the body of knowledge, correlating with the science classroom concepts and skills, and regulating instruction methods to carry out this integration. The integration of native knowledge in the science curricula might fill the gap of science education paths that students receive in schools with society and diminish the foreignness feeling. When the science classes harmonize with the student's life-world knowledge, science education will tend to raise the students' view of the world, and the enculturation process tends to transpire.

Efforts to expand the context of science education have been conducted by including relevant contexts in school science curricula. Blending indigenous knowledge within science curricula is required to prevent the alienation of learners. They can obtain indigenous knowledge, by collecting precise knowledge from their parents, grandparents, elder siblings, indigenous elders or someone who is responsible for transmitting skills and values. The purpose is to track down indigenous knowledge as groundwork for further school research and advance understanding of local to regional natural and environmental condition. During learning indigenous knowledge, students are supposed to recognise that science is always developing, but fundamental knowledge cannot be left. The cognition is influenced by the social circumstances, which include both cultural and intellectual norms by power relationships among those who create and those who make use of the knowledge (Sterenberg, 2013). The elaborating of indigenous knowledge

in the science curricula has strong implications for learners in terms of at least three ideas. First, students might conceivably improve all of the universal primary abilities and intelligence while receiving an indigenous knowledge field. Second, acquisition of the native area is a meaningful accomplishment. Finally, various research topics through several learning methods can change perspective and establish a deep understanding, such as storytelling, modelling, viewing, experiential learning, project-based learning, and collaborative learning.

Indigenous and European scientific knowledge frames should not be pitted opposite as traditional versus modern. Both pieces of knowledge must remain in harmony. The harmony cannot occur unless the both are respected as independent coexisting paths of knowledge. Preferably these two knowledge structures are relating and contributing to each other's improvement and development (Stephens, 2000). Indigenous knowledge sustainability is essential for students' future. It generates a strong relationship between what students experience in class and their lives out of school. School is the place where students can bring their cultural experiences that become their practices and ways of knowing (Meyer & Crawford, 2011). The pupil should be exercised proper skills and knowledge to undertake duties as part of civilians. They can assess information based on their knowledge (Chandra, 2014). Pupils can take more complex scientific ideas, skills, and advance their social understanding as well as applying the actual life. In other word, students acquire a valuable and meaningful learning.

The current sustainable development programme contains many issues that are straight concerned with indigenous communities (Magni, 2017). Indigenous science is closely related to cultural and global sustainability. In this sense, cultural sustainability aligns with a broader meaning of sustainable development to fit present needs without undermining the needs of the future generation. Its insights are invaluable in applying spiritual relationships with nature. The alliance of both fields of knowledge is space for local knowledge to gain better access into school science (Baquete et al., 2016; Glasson, Mhango, Phiri, & Lanier, 2010), a way of supporting young people to recognise their social and cultural value (Hewson & Ogunniyi, 2011) and highlight the advance of "understanding of local to regional biological and ecological circumstance and change into more powerful decision-making on the role of indigenous people" (Krupnik & Ray, 2007).

Some challenges that could hinder the elaboration of indigenous knowledge in the science curricula are that educators have been schooled in Western science and are more familiar with that general worldview than that of indigenous knowledge. The second one is the top-down system that is completed out of the curriculum policy and implementation. The third challenge is that the teacher needs adequate skills and competency, such as taking extra time, learning strategy. In addition, elaboration of indigenous knowledge into science curricula requires a collaborative learning process among stakeholders who are engaged in studying and addressing the sustainability phenomena (scientists, educators, indigenous practices, indigenous elders).

Limitations

The awareness weaknesses of indigenous knowledge involve the literature and information since the knowledge is derived from elders. Besides, some indigenous science holds traditional beliefs, which are considered inadmissible.

Conclusion

The paper argues that integrating indigenous science in the science classroom is possible in order to support meaningful learning and cultural sustainability. Learning of the concept of sustainability is essential to learners' future. Integrating indigenous knowledge is required to link the space and gaps that occur in the mind of students. Indigenous science helps the student think on the advocates of life and protect nature and culture from over-exploitation. The present study can serve as a reference for other researchers and educators to advance research on the indigenous paradigm for cultural sustainability and sustainable development.

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