

INVESTIGATION OF SCIENCE TEACHER PERSPECTIVE ON INDIGENOUS JAVANESE KNOWLEDGE

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ABSTRACT: Much Indigenous knowledge in the world is neglected and considering that it is not scientifically. This study aimed to investigate the views of science teachers regarding Native Javanese knowledge. Data were gathered through interviews with fifteen secondary school teachers. The results indicated four critical points of the science teacher's perspective: indigenous knowledge delivered orally, scientifically, needed to be taught in school science, and required a unique approach. The teachers' perception of Indigenous Javanese culture will help the learners recognize that the knowledge is relevant to school science and reduce the gap between both of knowledge.

Keywords: science teachers, secondary school, indigenous knowledge, Pranatamangsa

I. INTRODUCTION

Science teaching is both exciting and challenging. Learning science is an interdisciplinary area converged on the improvement of effective learning methodologies and solution. In the classroom, the student often has two contradictory interpretations of the same natural phenomena between indigenous knowledge and school science [1]. Learning in a school is the only official way to explain a phenomenon [2,3] and emphasizes the cognitive domain with a priority on problem-solving without knowing the benefit or its relevance in daily [4,5]. Learning science is also a reflection of Western knowledge that sometimes ignores social activity [6-8]. It has an impact on the lack of social activities of students in the community which causes students to alienate from their social environment [9], thus indirectly led to the crisis of the natural environment and the human which in turn affect the moral disaster, social and cultural change [10] that also led to a humanitarian crisis.

In the learning process, teachers play a crucial role in realizing successful changes in education. The teacher is a professional agent of a change by influencing, making choices and decisions at work that will have an impact on learning and student achievement [11,12]. The limited experience of teachers about indigenous knowledge and the weaknesses of teaching methods are factors that neglected indigenous knowledge in learning [5]. Indigenous knowledge is considered contrary to Western science as traditional knowledge versus advanced knowledge [13,14]. Moreover Universalist also claimed that indigenous knowledge has a minor explanation for describing the natural world [15] and It has not been proven scientifically such as western science [8], [16]. The impact of this cultural contact creates an imbalance in the community regarding the loss of cultural or traditional values because they are considered incompatible with the globalization era. Learning process recognized uniformly without reviewing the particularities, background, potential, and diversity that exists in students. These problems indicate that science education is not yet grounded. Hence, the teacher understanding the diversity of cultures, student cultural background, various teaching experiences, and perspectives, is required to build upon the distinct knowledge.

II. INDIGENOUS KNOWLEDGE

Native knowledge is a complex set of experiences and comprehensive knowledge. Indigenous knowledge covers technology and practices that exist and is still used by indigenous people to maintain their existence, survival and

adapt to the environment through the natural and social-cultural interaction [17,18]. Indigenous knowledge is local, traditional, beliefs that are often named with alternative wisdom or non-formal knowledge. Indigenous knowledge includes historical stories, myths, legends, culture, art, sports, music, ways of speaking, rhymes, games, languages, writing, scientific discoveries, social networks, and life skills [19-23]. The knowledge is not uniform, but the basic principle is the same since it is a product of human thought that is local and relative through trust, curiosity, imagination, causality, the objective and subjective [4,6,24]. Shiza assumed that indigenous knowledge is holistic, which describes all the flavors, both spiritual and physical [25].

The pattern of indigenous is more closely related to the cumulative reflection of a place or region based on natural phenomena which include humans and not humans as a part of nature [25,26]. Indigenous knowledge, peoples, and cultures are practiced the plural term to express the diversity related to place-based tradition and cultural foundation [27]. Native knowledge is more experimental than theory. Experience implied as the basis for building a perception, hypothesis, imagination, myth, and sciences [28]. During the intergenerational period, it becomes evidence of indigenous people investigation and problem-solving. So it cannot be seen that this knowledge only as a commodity that can be controlled by education, but it is a living process that must be absorbed, understood and relished.

III. JAVANESE KNOWLEDGE OF PRANATAMANGSA

Pranatamangsa is knowledge of cultural science, and full of wisdom that connects Javanese people with their environment to mutual understanding, respect and use of nature [29]. A distinctive feature of Javanese culture is that they always try to unite the natural world with themselves. *Pranatamangsa* is the local wisdom of the Javanese people in reading the natural signs to determine the season, which used as a guide by farmers and fishers [30]. This knowledge used solar circulation as a reference with a period of 365 days or 366 days. The *Pranatamangsa* system divides one year into 12 *Mangsa* (seasons) from Kasa (I) to Sadha (XII) as shown in figure 1.

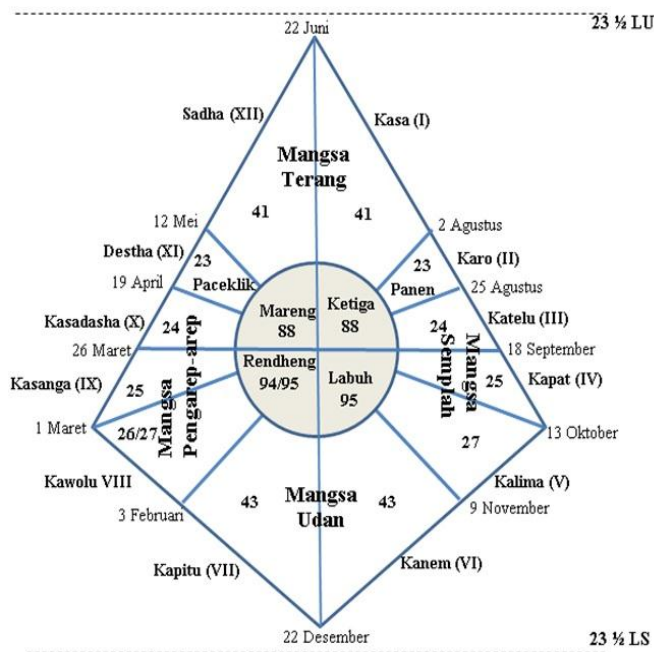


Figure 1. The solar system of Pranatamangsa
(source. *Pranatamangsa* document from Yogyakarta Palace)

The Twelve *Mangsa* on the *Pranatamangsa* calendar has different characteristics as the result of observations and studies of ancient Javanese from repeated experiences. *Pranatamangsa* can be divided into other units related to the agricultural season, namely the *Mangsa Ketiga* (88 days), *Mangsa Labuh* (95 days), *Mangsa Rendheng* (94/95 days), and *Mangsa Mareng* (88 days). *Mangsa Ketiga* includes *mangsa Kasa*, *Karo*, and *Katelu*, which identified as the dry season. *Mangsa Labuh* is a transition between the dry season and the rainy season, which includes *mangsa Kapat*, *Kalima*, and *Kanem*. *Mangsa Rendheng* identified as the rainy season, involves *mangsa Kapitu*, *Kawolu*, and *Kasanga*. *Mangsa Mareng* is a transition from *Rendheng* to the *mangsa Ketiga*, covers the *Kasadasha*, *Dhesta*, and *Sadha*. This knowledge is full of wisdom in reading natural signs such as the sun position, wind direction, weather, animal and plant behavior that connects Javanese people with their environment. *Pranatamangsa* helps farmers to plan their life, learning to manage the economy, frugality when entering the lean times and happy when at harvest [31]. *Pranatamangsa* teaches that humans must closely related to nature and the surrounding environment.

IV. METHOD

This study employed a qualitative exploratory method. The research aimed to investigate the understanding of science teachers in secondary schools regarding indigenous Javanese knowledge. The research question in this study; how do the views of science teacher about Indigenous Javanese knowledge?

To ensure that ethical aspects adhered to permission were acquired from the university to the provincial department of education and culture as well as the participating teachers. Purposive sampling was practiced in this research. This study was conducted in five secondary schools in Bantul Yogyakarta. The number of participants was fifteen teachers, five male and ten female. Participants

are science teachers who have teaching experience of more than ten years and has been certified by the Ministry of Education and Culture of the Republic of Indonesia. Three teachers are magisters in science education, and seven teachers are graduates of physics and biology education. The background of teachers is Javanese culture.

Data were gathered through interviews. Interviews stay conducted in depth in the form of open questions. Open interviews are chosen since the participants can answer questions more freely, flexible and respond more deeply [32]. This interview did not focus on how teachers view the nature of indigenous Javanese knowledge, but on the importance and relation of native Javanese knowledge and school science. Some examples of question items are: Do you know indigenous knowledge (traditional knowledge)? Do you understand *Pranatamangsa*? Where did you get that knowledge? Do you know if *Pranatamangsa* is scientific? Is knowledge of *Pranatamangsa* relevant to be taught at school? Etc.

Data were analyzed using four stages includes: reading and organizing data, explore and sort the data, descriptive analysis, and the validation. At the initial stage, researchers read and collected research data into a matrix. The researcher interpreted the data to find out the suitability of the data with the research framework. Data that was not deemed will be sorted or reduced to look for confirming and disconfirming evidence that supports the research frameworks. The sorted data are then read in more detail to provide a theme. The themes were then analyzed descriptively to answer the problem statement. Descriptive analysis was carried out again to look for precious findings from research, limitations of the study, suggestions needed for further research and research views that might conflict with the literature. Furthermore, the data that has been obtained is validated using triangulation. Triangulation method presents the research process more systematic by mutually crosschecking data so that judgments are trustworthy [32,33].

V. RESULT

The results of this study indicated four critical things about the science teacher's views on indigenous Javanese knowledge.

A. Indigenous Javanese knowledge is expressed orally

Traditional Javanese knowledge conveyed through the culture and belief. It requires a deep understanding to be in form with scientific knowledge. One teacher said, "I grasp the *Pranatamangsa* from my parents and grandparents." While Other teacher claimed, "I know *Pranatamangsa* when interacting with Javanese elders and farmers." Indigenous knowledge content is habitually held by certain elders when they were young to be practiced for many years. Indigenous Javanese knowledge was passed down verbally (*Pitutur*). *Pitutur* is the delivery of information orally from elders to young people in the form of a story/legend, *tembang* (song), *gugon tuhon* (advice and prohibitions), and *lambang* (symbol). *Pitutur* contains the teaching of manners include honesty, trustworthy, discipline, kindness sincerity, wisdom, self-efficacy, respect, loyalty, honor, and justice.

B. Native Javanese knowledge is scientific

Respondents stated that traditional knowledge in Javanese society was scientific. This knowledge integrated with culture, tradition, life skills, and belief. One teacher said "I

thought *Pranatamangsa* is scientific since it contains the knowledge of seasons, plants and animals. The *Pranatamangsa* is relevant to be taught in schools as long as there is a reference." While other teacher stated that "*Pranatamangsa* also includes *kawruh pawukon* (horoscopes) and *palintangan* (astrology)." Native Javanese knowledge is holistic in the form of life skills and beliefs. The scientific concepts in *Pranatamangsa* include seasons and climate change, astronomy, living and nonliving things, land and living processes.

C. Native Javanese knowledge requires to be thought in class

Teachers claimed that traditional Javanese knowledge needs to be taught. One teacher claimed, "This knowledge is critical to school, so students are more knowledgeable about their traditional knowledge, including me as the teacher." They claimed that learning traditional Javanese knowledge can make students more concerned with local knowledge, giving rise to a new perception that native knowledge is scientific and still relevant to modern science, builds a sense of caring for the culture sustainability, raises respect for the history of its ancestors, and enhances social skills. One of teacher posits that "It is essential to be taught, but personally, I do not know which part to explain since it blended with myth, beliefs, and culture."

D. Need special teaching approaches

The teacher believed that to be able to teach traditional knowledge a particular approach was needed. This approach must involve the Javanese community, especially Javanese elders. Javanese elders are a source of knowledge. One teacher said "In my opinion, it is necessary to involve native Javanese elders in class. I think it is also required to present and share their experiences and knowledge more depth in teacher forum." Another teacher also stated, "maybe we need to build an indigenous learning community as a forum to accommodate teacher and indigenous expert." They believed that specific teaching strategy and method also needed to teach indigenous knowledge and integrate it within the school science curricula.

VI. DISCUSSION

Every culture has an impact on the environment and local knowledge. Cultural adaptation is expected to overcome the intersection between indigenous knowledge and science in schools in harmonization [34,35]. Native intelligence is found in certain cultural groups that are taught from generation to generation. Every indigenous group has its own unique path which is a series of historical, social changes [36]. The science system as a culture is characterized by the adaptation of cultural norms which is harmonious with socio-cultural learning. This implies that socio-cultural knowledge plays a vital role in learners' education [37,38].

The qualities of teachers are critical to success in the classroom. There is a connection that exists between teachers view on a specific concept and how they teach [23]. Teachers are a crucial factor in teaching indigenous science to students. In this case, it's essential to build an understanding of the indigenous science teacher in advance. The more experienced and informed science teacher engages the learner in a diversity of thinking processes and methods to help student construct their

understanding and to consider how the knowledge can be practiced to enhance their lives [39].

The results of the study show that science teachers realize that traditional knowledge in Javanese society is crucial to learn. They believed that indigenous knowledge and school scientific knowledge could coexist and be resources of others. Both indigenous knowledge and science classroom can thus complement each other [7]. The teachers considered to the Javanese contexts would make the student feel better by seeing and learning their culture valued in the classroom. Introducing indigenous knowledge in science curricula will make science more relevant and appropriate for students with different cultural backgrounds, and build their self-identity [28]. Science teachers agreed that knowledge is scientific and vital for cultural sustainability, but information that is both verbally and unwritten causes difficulties in identifying the scientific concepts. Hence a unique approach such as forming an indigenous learning community is needed.

Learning science should be practiced based on students' socio-cultural circumstances because they can quickly determine the connection between their experiences and their science content taught at school. Teachers who do not share the student cultural background may not be aware of how their own culturally based expectations affect student understanding [39]. The complexity here is that the teacher's knowledge around native Javanese knowledge content is weak and limit. Science teachers must equip with the basics and values of native Javanese culture if teachers have to teach another knowledge system. A right constructivist teacher will recognize the importance of knowledge, how relevant science in a learner's lifetime, and cultural sustainability [40].

The indigenous knowledge presents the diversity of knowledge in science, to keep all peoples' experience, enhance motivation, and self-esteem of the learner [36]. Indigenous Javanese knowledge teaches Javanese people to care of the natural world by preserving the ecosystem, respecting the cultural heritage of ancestors through the habit of sustaining the culture. A particular knowledge, such as *Pranatamangsa* is related to the maintenance and conservation of the ecosystem. Traditional knowledge has its roots in relationships and interactions between humans, non-human with nature [10]. The native Javanese knowledge thought is circular, thinking and acting not only shorter, but long consideration about what will happen, how it will impact, and how it will continue, will be said and actualized in action. The richness of the Javanese knowledge with a right approach will give a new perspective in the education.

VII. CONCLUSION

Indigenous knowledge in the Javanese community is holistic, blends with customs and beliefs as a way of life and philosophy. Traditional Javanese knowledge is scientific and essential for Javanese learners both of teachers and students. Science teachers recognize that knowledge is scientific and vital for sustainability, but information that is both verbally and unwritten causes difficulties in identifying which concepts are suitable or not to be taught. The complexity here is that the teacher's knowledge around native Javanese knowledge content is weak and limit. This study is expected to provide an overview of the importance of learning traditional

knowledge so that cultural sustainability can be maintained and eliminated learner alienation.

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