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OGOH-OGOH : AN INDONESIAN CREATIVE LOCAL WISDOM INSPIRED BY HINDU PHILOSOPHY AS ETHNO-PHYSICS

By:
Hanandita Veda Saphira1, Nadi Suprapto2,Setyo Admoko3
1,2,3Faculty of Mathematics and Natural Science, Universitas Negeri Surabaya
E-mail: 1Hanandita.veda@gmail.com, 2nadisuprapto@unesa.ac.id, 3setyoadmoko@unesa.ac.id

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Abstract

One of the local wisdom that can be used for physics learning-media is Ogoh-Ogoh. Previous research, exploration of the value of Physics is limited to others local wisdom. Thus, the authors realized the need for further identification of ogoh-ogoh as the local culture of Hindus who are in Surabaya as a research topic, which aims to develop the learning-media of physics integrated local-wisdom in schools or people and analyze ethnoscience conception on Ogoh-Ogoh. This research is included the type of qualitative research using triangulation: interviews, indirect observations and literacy studies. Based on the results of analysis and discussion related to the concept of Physics in ogoh-ogoh culture, it can be known there is an application of physics concepts that are not realized by the perpetrators of Ogoh-Ogoh. Thus, a local wisdom Ogoh-Ogoh can be used as a medium of learning, especially in the field of Physics, one of which is to increase their science-Physics (Ethno-Physics) knowledge into more real scientific knowledge.

Keywords: Local Wisdom, Indigenous Science, Ogoh-Ogoh, Physics.

I. INTRODUCTION

Physics is one branch of natural science that studies natural phenomena with different types of symptoms (Harefa, 2019; Retnawati et al., 2015; Sari & Rifai, 2019; Wiwin & Kustijono, 2018). Physics is one of the subjects that are considered difficult by learners, this is because Physics refers more to theory and mathematical science (Herliandry et al., 2018; Khinanti et al., 2020; Putra & Wiza, 2019). In addition, learners have difficulty interpreting Physics into examples of real-world problems (Mufida & Setyarsih, 2019; Redhana, 2019). Therefore, teachers need to design an interesting and fun Physics lesson for students so that a teaching-learning process can be carried out effectively (Arimbawa et al., 2017; Fidan & Tuncel, 2019; Gupta & Pathania, 2021; Mamonto et al., 2021; Sutarto et al., 2020; Syafril et al., 2021). One way is to select learning media that can support learning activities and make them fun (Khoiriyah et al., 2021). One of the most basic things in the learning of Physics can be done directly by students by applying scientific behavior. These results will have an impact for students to be able to conclude the physics learning they have learned (Semaranatha et al., 2017). With the selection of media used interestingly and creatively, physics learning can be carried out in a conducive manner (Hikmawati et al., 2019; Khair et al., 2021; Khoiriyah & Suprapto, 2021; Oktaviana et al., 2017; E. Sumiati et al., 2018). Teachers are very important in the teaching and learning process, for example as active models and guides, who are active and creative in developing physical knowledge, science process skills, and good student character (Suastra et al., 2017).

Based on (Hartini et al., 2018), teaching and learning activities in schools can be integrated into a local wisdom. Incorporating local wisdom into a learning activity is supported by Vygotsky's Sociocultural Theory. This theory explains that children are formed based on the environment in which they live. Therefore, children's learning activities in this case are learners starting from their environment (Muenks et al., 2018; Pietro et al., 2020; Purwanto et al., 2020; Rasmitadila et al., 2020; Wang & Marsh, 2002). Thus, phenomena seen or experienced by learners can be integrated in learning tokontukan a deeper understanding of learners' learning materials (Misbah & Fuad, 2019). According to research by (Oktaviana et al., 2017), stating that the effectiveness of the use of local wisdom-based Physics modules states a category of high effectiveness. In line with research by (Hartini et al., 2018), physics learning media integrated with local wisdom can be used. Then research by (Wahyuni & Lia, 2020) mentioned that the use of comic media Physics based on local wisdom has a potential impact on the learning outcomes of physics learners. One of the efforts to improve learning outcomes is through the utilization of physics teaching materials on the basis of the implementation of local wisdom (Fitriah, 2019). Science education learning should be integrated into culture-based and ethnoscience learning in most classroom activities. Thus, balancing globalization and localization through glocalization. One of the efforts to do glocalization is the application of culture-based learning with ethnoscience in science education (Suprapto et al., 2021).

One of the local wisdom that can be used for physics learning media is Ogoh-Ogoh. Ogoh – ogoh is a work as well as cultural culture in the social life of Balinese citizens that has symbolic meaning and expression of freedom (Aristrawati, 2018). Ogoh – ogoh is an attraction with the Tawur Kasanga ceremony is a creative attitude from Hindus as a celebration of Nyepi Day (Kembarawan, 2020). Ogoh-ogoh began to appear in Bali around the 1980s by young people who joined a group of Sekaha Teruna-Teruni who were in the pekraman village in both the village and the city in Bali (Ariawan et al., 2014). Ogoh-ogoh is a sculptural artwork depicting the measured and indisputable personality of the butha kala (the power of the universe and time) in the form of three-dimensional, gigantic forms made of solid, soft or flexiblely assembled materials that are then wrapped in layers of paper or cloth, colored and plastered with hair resembling humans, animals, or combinations of humans and animals in the form of character such as butha kala, gods and dolls (Miyana et al.,

2019; Suharta, 2019). The purpose of making ogoh-ogoh is to eliminate the evil that is sweeping nature, especially bhutakala in humans. From bad behavior is expected to turn into a way of manners (Watra, 2018).

Research by (Khoiriyah et al., 2021), (Wulansari & Admoko, 2021) and (Sholahuddin & Admoko, 2021), Explore the concepts of Physics on local wisdom such as puppetry, Dhadak Merak Reog Ponorogo dance and traditional kolecer games. From previous research, exploration of the value of Physics is limited to puppet culture, Dhadak Merak Reog Ponorogo dance and Klocer games. Thus, the author realized the need for further identification of ogoh - ogoh local wisdom as the local culture of Balinese people, especially Hindus who are in laban, Lakarsantri, East Java as a research topic on the concept of equilibrium and style, which aims to develop the learning media of physics integrated local wisdom in schools and its implementation to the wider community and analyze ethnoscience conception on local wisdom Ogoh-Ogoh.

II. METHOD

This research is included in the type of qualitative research using triangulation, namely interviews, indirect observations and litersian studies to explain the concept of Physics contained in the Ogoh-Ogoh culture. This triangulation is used to test the credibility of data to be examined from various sources with varying data as well as to corroborate the validation of studies (Alfansyur & Mariyani, 2020; Creswell, 2017). The in-depth interview used open-ended questions by prioritizing ethical attitudes towards respondents through whatsapp respondents, namely an Ogoh-Ogoh statue maker in Surabaya on November 16, 2021. Indirect observations come from observations of documentation and video making to the implementation of Ogoh-Ogoh celebrations given by respondents to researchers (Arnild Augina, 2020). Literacy studies from this study use sources from books, journals, and research that has been done (Radiusman, 2020).

The stages used in this study include (1) the collection of information about the details of Ogoh-Ogoh culture (interviews, literacy studies, indirect observations, documentation studies); (2) sorting information relevant to the concept of Physics; (3) explore the concepts of Physics in the Ogoh-Ogoh culture; (4) incorporating the concepts of Physics in the Ogoh-Ogoh culture that have been found into a sketch of the drawing; (5) analyze the concept in writing; (6) make conclusions and suggestions (Khoiriyah et al., 2021).

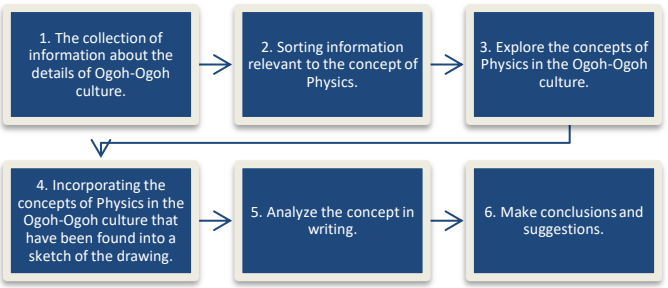

Figure 1. Steps used in research

III. RESULTS AND DISCUSSION

Local Wisdom and Etnoscience

Local wisdom or often called local wisdom can be interpreted as human effort by using his mind (cognition) to act and behave towards something, object, or event that occurs in a certain space (Darmadi, 2018; Diab & Muhalling, 2018; D. Sumiati, 2017; Widyaningsih & Kuntarto, 2019). Local wisdom usually also describes one specific phenomenon that would usually characterize the group's community (Sudarmin & Parmin, 2014). Local wisdom as an attempt to find the truth based on facts or symptoms that apply specifically in a particular culture and local wisdom of a particular community (Sudarmin et al., 2014). The local wisdom of the nation began from the values, rules in the family and then developed in the community (Uge et al., 2019). In line with this, local wisdom is one of the main things so that a culture remains sustainable and its development can benefit national culture. Exploration of matters related to science in local wisdom can also develop the development of the community to be more meaningful by a nation..

Ethnoscience is a study of science that accepts knowledge from a culture and has a role as a basis for realistic knowledge from a person that can be associated with science knowledge (Novitasari et al., 2017). Ethnoscience approach is a learning environment creation strategy and learning experience design that integrates culture as part of the IPA learning process (Atmojo, 2018; Khoiri & Sunarno, 2018). The integration of original knowledge into the journey of Environmental Physics is expected to help students with local and western cultural principles (Nuroso et al., 2018). Ethnoscience learning opportunities provide space for the world of education to assist local governments in optimizing the potential of regions related to ethnoscience potential. One way that can be used to improve students' abilities is to integrate ethnoscience or local wisdom into the learning material (Wati et al., 2021). Research by (Dewi et al., 2021; Hastuti et al., 2019; Nurcahyani et al., 2021; Nuroso et al., 2018; Rusilowatil et al., 2021) provides the result that the application of ethnoscience-based learning 1) the use of Ethnoscience learning greatly affects the competence of students as seen from the realm of knowledge and attitudes; 2) ethnoscience effects based on contextual collaborative learning capacity of scientific literacy in student content, processes, and attitudes are higher than other learning media; 3) the development of local wisdom-based science learning design to develop a positive character in the school that the implementation of science learning based on local wisdom not only improves the positive character of students in school but also improves student learning achievement; 4) can help students to learn and acquire original knowledge among socity through scientific investigation to reveal scientific truths.

Ethnoscience Studies On Ogoh-Ogoh

The results of studies and analyses on ogoh-ogoh culture show the value of local wisdom and the potential of ethnosasins that can be implemented as a reference for science learning. Based on research by (Rachmawati, 2017) There is a form of local wisdom in concrete terms and ideas in the form of bhuta yajña ceremony and Ogoh-ogoh art conducted by hindu people in nyepi celebrations in Bungso Wetan hamlet, pengalangan village, Menganti subdistrict, Gresik regency, East Java. In the ceremony sequence contains a lot of the value of wisdom loka that the artwork was made to have a clear and definite purpose, namely enlivening or glorifying the ceremony. Ogoh-ogoh is displayed with the foundation of a high concept of cultural art and imbued with Hinduism. Nyepi Day celebrations in Gresik Regency are colored by the burning of ogoh-ogoh which is believed by Hindus as a symbol of wrath on the face of the earth. The concept of local wisdom contained in ogoh-ogoh art and lexicon ogoh-ogoh ritual contains the values of hindu beliefs / beliefs along with harmony with fellow humans, the value of harmony with their creator, and the value of harmony with the universe.

The Results Of The Analysis Of The Concept Of Physics In Ogoh-Ogoh

Based on the interview conducted, ogoh-ogoh weight ranges from 300 kg, with the main material used is bamboo that is divided into thin parts, then glued using tape. To give texture to the statue, use newspapers and paper that then to cover the remaining cavities using white cement. After that, the statue is sanded to be smooth. After that, the making of the head is done in the last cross. The use of 'hair' in Ogoh-Ogoh uses plants and foliage which are then colored using fabric dye. For the whole Ogoh-Ogoh is painted using airbrush techniques to look realistic. Then, for the finishing Ogoh-Ogoh given fabric and other accessories. The length of ogoh-ogoh work ranges from 5 to 6 months.

Figure 1. Achivist Ogoh-Ogoh at Babatan, Surabaya, Jawa Timur.
(Source: Respondent's documentation)

With a weight of 300 Kg, Ogoh-Ogoh is usually lifted approximately 4 people per statue. Respondents also said that if more people are lighter, but because of differences in height, differences in thinking, then it can actually inhibit the process of lifting and moving Ogoh-Ogoh. With the variation of the person who raised Ogoh-Ogoh does not use special techniques in the process of lifting or stirring. However, the most important thing is to do it together so that Ogoh-Ogoh does not collapse. In line with this there are no specific criteria for people who can lift Ogoh-Ogoh. The value of local wisdom gained from this interview is that the beliefs of respondents who likened Ogoh-Ogoh as a 'home' that can be lived in by creatures that cannot be seen. Ogoh-Ogoh is shaken through pageantry to attract the attention of the creature. After that, Ogoh-Ogoh was burned along with the creature. From a series of manufacturing processes to the implementation of Ogoh-Ogoh, respondents claimed not to think about the physics component in it. This proves that everything the respondents do is indigenous science.

The concept of Physics that can be implemented in a series of Ogoh-Ogoh ceremonies held one day before Nyepi Day is as follows:

1. Achivist Process

When it comes to the motion of an object, it is inseparable from newton's force or law. The motion of an object can be explained by newton's three laws (Mikrajudin, 2016). The concept of physics that can be observed at the time of the first process of the stir is Newton's Law I. Newton's Law: The tendency of an object to maintain its state (Galili & Tseitlin, 2003; Okyranida et al., 2021).

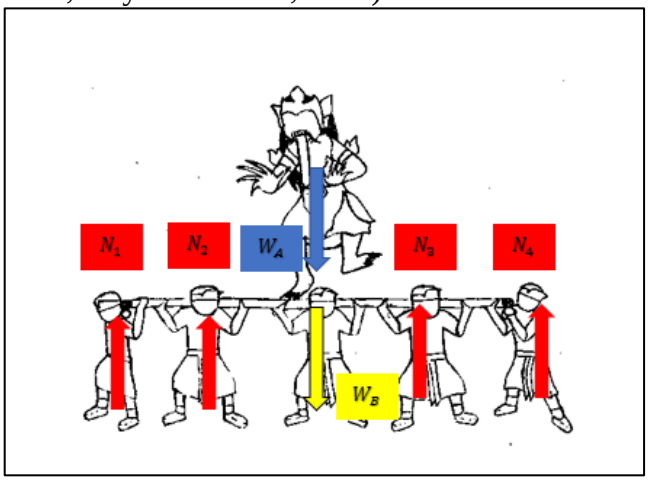

Figure 2. Newton's Law I on Ogoh-Ogoh

The equations in Newton I's Law are as follows.

$$\sum \vec{F} = 0 \qquad \text{...(1.1)}$$

Thus, from Figure 1.

$$N_1 + N_2 + N_3 + N_4 = W_A + W_B$$

$$N_1 + N_2 + N_3 + N_4 = W_{Tot} \qquad \text{...(1.2)}$$

Then, in the process of shouldering the statue can also be analyzed the concept of equilibrium of rigid objects, namely as follows:

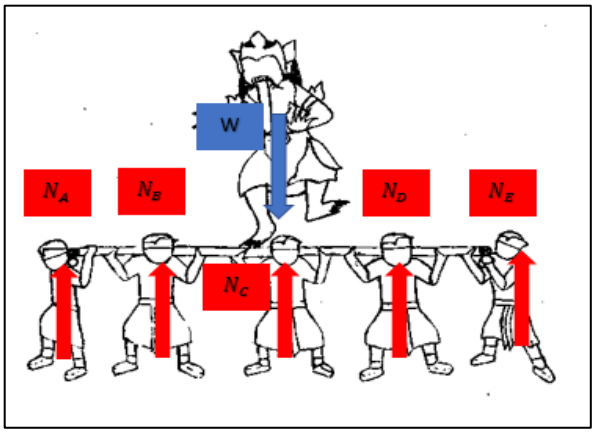

Figure 3. Concept of Rigid Object Equilibrium in Ogoh-Ogoh.

Based on Figure 4. Can be analyzed as follows. With d is the length of the arm or the

distance between one speaker and the other speaker.

$$\sum \tau_A = 0 \qquad \text{...(1.3)}$$

$$W.d_A - N_B.d_{AB} - N_C.d_{AC} - N_D.d_{AD} - N_E.d_{AE} = 0$$

$$\sum \tau_B = 0\,; \qquad \text{...(1.4)}$$

$$\sum \tau_C = 0\,;$$

$$\sum \tau_D = 0\,;$$

$$\sum \tau_E = 0$$

When the speaker shakes the statue to attract the attention of the "giant" then there is Newton's Third Law in it. It is depicted in Figure 5. Newton's law: "Every action will cause a reaction, if one object exerts force on another, the object affected by force will give a force of equal magnitude to the force received from the first object, but the direction is opposite."

In Newton's Third Law, the formulation of the statement is as follows.

$$F_{act} = -F_{react} \qquad \text{...(1.5)}$$

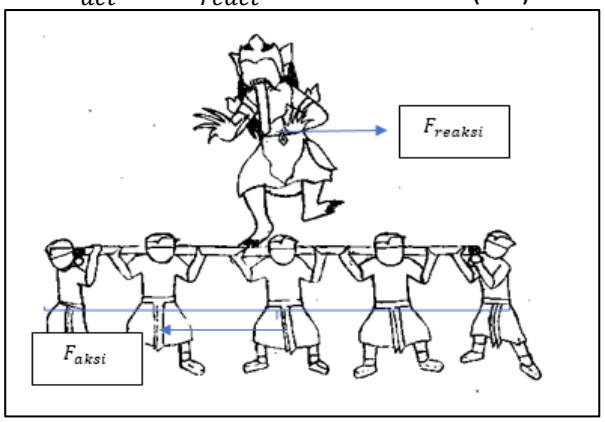

Figure 4. Newton III's Law at the time ogoh-ogoh was shaken.

2. Burning Process

During the ogoh-ogoh combustion process, there will be a transfer of heat radiation from the fire to its environment. Heat is the transfer of internal energy. Heat flows from one part of the system to another because there is a temperature difference (Young et al., 2012). If there are hot objects and cold objects that touch then soon the temperature of hot objects drops, while the temperature of cold objects will rise. This happens because hot objects release heat to cold objects. So, heat naturally moves from an object with a higher temperature to an object with a lower temperature (Irawati et al., 2019). Examples of heat transfer by conduction, convection and radiation in everyday life are: in conduction there is a gauze wire (conductor) often placed on a bunsen burner, a pot for cooking, a fishing handle made of metal, and an electric iron base made of metal. In convection transfer is the movement of water that boils when heated. And in the transfer of radiation, black objects will absorb more heat than white objects, and thermos (Kanginan, 2002).

IV. CONCLUSION

Based on the results of analysis and discussion related to the concept of Physics in ogoh-ogoh culture, it can be concluded that in the process of implementation from the process of mobilization to the burning of Ogoh-Ogoh there is an application of physical concepts that are not realized by the perpetrators of Ogoh-Ogoh. In the process of salting, in it there is the principle of Newton's Law I to carry Ogoh-Ogoh, then there is the principle of fairness of rigid objects to keep Ogoh-Ogoh from collapsing or falling during the process of moving. Then, it is also known Newton's Law III when the speakers shake the statue that is being carried. If the dancer moves to the left then there will be a reaction style on the statue, which is the opposite style to the style of action given.

In the combustion process, the heat transfer from the statue that is being burned is in the surrounding environment. People who are around the burning area will feel hotter than people who are far from the burning area. This is the application of the principle of heat radiation. As described above, that all the concepts of Physics occur without realizing the perpetrators of activities, they only rely on feelings during the implementation process. It can be referred to as the original science of society or Indigidenous science. That way, the

analysis of local culture on the concept of Physics can help improve people's understanding through learning with cultural media that are familiar with their lives. Thus, a local wisdom Ogoh-Ogoh can be used as a medium of learning, especially in the field of Physics, one of which is to increase their science-Physics (Ethno-Physics) knowledge into more real scientific science knowledge.

Further research can conduct studies in other subjects about ogoh-ogoh culture, can be chemistry, biology or other subject subjects. Thus, ogoh-ogoh's local wisdom can be explored in a spiritual way. I would like to say a big thank you to all lecturers in the local physics course who have facilitated the writing of this article in full. Then, my colleagues who have fully supported the creation of this article.

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