TEACHERS' PERSPECTIVES ON GLOBAL WARNING IN MATHEMATICS LEARNING

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ABSTRACT

Global warming is a natural phenomenon that urgently needs to be repaired to ensure the survival of creatures on Earth. To overcome this, the entire community must have an understanding of global warming, especially in the field of education. Before providing knowledge to the public, It is necessary to know the teacher's perspective as an educational facilitator regarding integrated learning on global warming. This research describes teachers' perspectives regarding global warming, especially in mathematics learning. This research is qualitative research with descriptive methods. The sample used was twelve high school mathematics teachers in Semarang City consisting of young and senior teachers to gain understanding from different points of view. Data collection uses an interview instrument. That instrument has received validation from experts before. The research results show the possibility of using the global warming phenomenon to realize a low-carbon society in Mathematics learning. However, there are difficulties in integrating it into Mathematics learning. It is necessary to develop a learning model that applies global warming to Mathematics learning so its implementation is evident.

Keywords: perspective, global warming, mathematics learning.

INTRODUCTION

The impact of economic growth in Indonesia on environmental development challenges causes environmental problems (Mangunjaya, 2003). Mass cutting down of trees and burning of forests to meet the needs of industry and public housing, manufacturing, and industrial activities, and excessive use of chlorofluorocarbons (CFCs) causes prolonged emissions which hurt the environment, in particular increasing global temperatures (global warming), which is the most pressing environmental problem in the world.

In Indonesia, economic development issues are being addressed through sustainable development using the Sustainable Development Goals (SDGs), which contain 17 sustainable development goals and their targets (Ministry of Environment and Forestry, 2022). The government has made

various efforts to encourage sustainable development, one of which concerns handling climate change as regulated in Law No. 32 of 2009 concerning Environmental Protection and Management. This law states that the community has the same and broadest rights and opportunities to play an active role in environmental protection and management. However, people still do not use these rights and opportunities because the first cause of climate change, especially global warming, is pollution from non-recyclable waste such as plastic and Styrofoam, which are still frequently encountered needs.

It is crucial to raise public awareness about the environment to address the issue of global warming in Indonesia. Education can start from anywhere, including in the world of education. Education has a role in forming a person's character (Nugroho, 2020: 208), and one aspect of character development is fostering a sense of care for the environment through learning. Instilling the value of caring for the environment and understanding global warming can be incorporated into mathematics education is a product of human thought linked to concepts, processes, and logic. With this reasoning, students can take action on existing problems (Dewi, 2015: 117). By implementing this approach, it is hoped that it can help solve the problem of global warming. Developing environmentally caring character values in learning can be applied to processes, techniques, and assessment instruments (Prihaswati, et al, 2017). However, mathematics learning has been taking place so far and has not used the theme or context of global warming. The purpose of this research is to determine teachers' perspectives regarding global warming in mathematics learning.

METHOD

This research is a qualitative descriptive research. This type of qualitative explanatory research displays pure data without manipulation or other treatment processes. This research aims to present an overview and clarify it according to the occurring phenomena (Rusandi and Rusli, 2020). The population in this study were all high school and equivalent mathematics teachers in Semarang City, with the samples taken being senior teachers and young teachers in Mathematics subjects taken from two state high schools, two private high schools, and two vocational schools in Semarang City. This sampling is based on considering differences in views between the two groups. This research uses semi-structured interviews that have been validated by experts.

FINDINGS AND DISCUSSION

From the results of interviews conducted with 12 young and senior teachers in the field of Mathematics, it was found that there are

opportunities for the Mathematics Low Carbon Project learning plan. This is evident in the following interview excerpt:
State High School Teacher A
Speaker 1 (Young teacher)
A: "It's a shame to take this example because global warming is a hot topic. If this is the case, what do you think about this mathematics, using the context of the global warming phenomenon in learning?"
N: "Yes, you can, sir. Yes, maybe because in class 10 there is statistics material, right?"
A: "Yes"
N: "Ahahaha, statistics is possible, we can make readings related to global warming and there is data that can be read with children."

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A: "Then for the example this, eh... what? "In the context of global warming or climate change or global warming, if we use it in mathematics learning, do you think there is an element of usefulness or something like that?"
N: "If it's useful, it's there, sir. Especially if we make me.... what? Let's first solve the problem which is a bit long in my mind, Sir, yes, about statistics, let me go straight to the material, OK? Ahaha. "So, in the statistics material, there's a lot of data to read, so we can study statistics while learning new knowledge related to global warming, right? That's not a problem."
Resource person 2 (Senior teacher)
A: "No, ma'am. Then, isn't this a presupposition? What does this mean if the context is like global warming or global warming, according to you, if it is used in mathematics learning, according to Mrs. How do you think? Do you agree or what?"
N: "The principle is that we learn as long as we can connect with the material, our material doesn't matter. So relate it to everyday life in the environment around us."
A: "Contextual, right?"
N: "Yes, it's better. "So the children connect more quickly if we directly direct them to real life, they face this like that, they connect more."

State High School B teacher
Resource person 3 (Young teacher)
A: "Then, according to you, this global warming phenomenon, is it possible for us to use it in mathematics learning?"
N: "Learning?"
A: "Yes"
N: "Global warming?"
A: "Prompts you to think, hahaha"
N: "What? Calculating rainfall like that?"
A: "Yes, this is possible ma'am, if it's not possible, that's okay, but if it's possible"

N: "Yes, it could be possible, but so far I'm not used to that context, so I think it's possible. It's just what it is that might take a little longer to think about."
A: "So, ma'am, if for example, it will be possible because global warming is being felt right now, sis. And when is it used in the mathematics learning process, according to Mrs. How do you think? Do you agree or object?"
N: "Yes, if you agree or not, you agree. Because, all this time, sometimes children also ask, 'What are we studying for, Mom?' Moreover, if by chance at SMA 11, we have an athlete class, I happen to be teaching full-time in the athlete class in Jatidiri. Sometimes children like that don't feel important. It's just an obligation, taking part in the lessons I get grades on report cards, and the report cards we use are sometimes like that. Well, but for example, if mathematics is then linked to a context such as global warming, if for example there will be one in the future, I think that's good. Because they will feel the benefits when studying. Even though it looks like that, I haven't imagined it yet, hahaha."
Resource persons 4 and 5 (Senior teachers)
A: "But, when teaching mathematics uses wider contests, maybe one day, what do you think global warming will be like? Not only global warming but maybe other contexts might also be more relevant when used in personal mathematics learning, ma'am?
T: "Yes, if children can relate to learning, why don't we accept it if, for example, it is something new knowledge that can be connected to mathematics material, why not?"

Vocational School C teacher
Resource person 6 (Young teacher)
A: "Then your explanation earlier in mathematics learning uses context, right? For example, what do you think about the context of global warming being used in mathematics learning at vocational school?"
N: "Well, that's quite interesting, sir, perhaps, because it's possible to find a connection first, meaning global warming and mathematics material can be linked to any material like that, sir. Because mathematics is linked to contextualization, which is better, sir. Especially with problems like global warming, common problems are more interesting.
A: "What about the benefits? "Later, if you use that approach, maybe you will use another context before, right? If you use this context later, what do you think will be the benefits?"
N: "Maybe additional education, yes, additional education apart from mathematics, they will also gain knowledge related to global warnings so that in the future the children will care more about the environment and be more aware of the current conditions on earth related to global warming. maybe that's it, sir"

Private high school teacher D
Resource persons 7 and 8 (Young teachers and senior teachers)

A: "Hey, okay, it's related to global warming, yes, I also happen to be doing further research related to global warming, so I'm trying new things with mathematics, whether it's connected or not. Well, what do you think, ladies, if we use the global warming phenomenon in the context of mathematics learning, what do you think?"
D: “Global warming? How come it seems strange, ma'am? Ahahah"
B: "Ahahaha Mrs. Alif first"
A: "Mrs. Alif first, Mrs. Alif first"
S: "It seems so strange, I can't describe how strange it is, basically, strangely, global warming is included in mathematics. There must be chemical formulas too, right?”
A: "Yes, we will still have to adjust the conditions first. What do you think it used to be like?"
S: “What's certain is that we add this additional formula, it's complicated. "Students already know the basics first, later if there is additional material on global warming in mathematics they will add formulas, and so will the students and the teachers."
A: "Adding thoughts, aha"
D: "Adds to the burden of life, aha"
A: “Yes, but yes, that's later. What about Mrs. Desi, ma'am?"
D: "Yes, it's complicated, it's complicated, but if for example, it looks like it's possible, you can learn, like controlling the temperature, then what's the temperature outside, then maybe the chemistry will be like this, then later the chemistry will be how to get the temperature low or how can it be like that? Chemicals can also make artificial rain, yes that's possible. Maybe it's possible, I just don't know how to implement it, it might be difficult, kids nowadays want it instantly."

A: “Yes, it's like radiation. Yes, that means that now, yes, this is one thing: mathematics and chemistry are not connected, it's strange, but it turns out that in everyday life we have separate disciplines, chemistry itself, biology itself, it can't be seen that in everyday life we study mathematics, chemistry, and physics, right? the specifications are true. "This Lajeng, Ma'am, is related to whether we use global warming or global warming in learning, do you think there will be any benefits for students or teachers?"
D: "Yes there is, there must be, of course, every learning must have benefits"
A: "Perhaps it is possible to convey something specific like that"
D: "Yes, maybe there are students who are interested, 'Oh it turns out that calculating this can reduce global warming' By calculating this, can global warming increase, so we can enjoy better air? There is"
A: "For Mrs. Alif? "Related to this, maybe there are benefits or will it just cause more headaches?"
S: "Yes, maybe students can anticipate the times, 'if I do something like this, there will be consequences like this'. So what can students do, ma'am, if they want to do something, they can think about it before global warming occurs.

"Yesterday there was also a P5 project that collects plastic waste to make an ecobrick."

Vocational School E teacher
A: “Oh yes, I'll repeat it. What if, in teaching mathematics, we used the context of global warming or global warming according to you? Do you agree or not?”
N: "Hey, from that effect, you mean global warming, right, sir?"
A: "Yes"
N: "The warming that is happening around us in Semarang means something to us"
A: "Hey"
N: "There are hot and cold things, that's okay, it's not appropriate to use the term like that."
A: "Well, what do you think about a context like that if we use it in teaching mathematics? Do you agree or not?"
N: "In what kind of learning context, sir, for example?"
A: Hey, maybe we can use temperature data, temperature rise, sea level rise, weather anomalies, like that, ma'am, for example, you."
N: "Oh hey"
B: "Permission to add, sir, or maybe something like this, ma'am. For example, when mathematics is related to sales, usually the context is sales, but when it is related to global warming, what do you think, according to Mrs. Upik and Mrs. Samik?" Is that possible or what, ma'am?"
N: "For example, if I apply this to mathematics, mathematics lessons, ma'am, sir, actually I think we have implemented it. That means, for example, if it's like this now, we're giving practice to our children in a really difficult language, right? Then the children can't do that, right? Well, we're reducing that, right? We reduce it a little bit in the end until it's hot, for example. This means that what is difficult is that we consider it hot, right? Then we consider the easy ones, oo, this is a change, we change from difficult questions to easy questions like that. I think that's how it is in mathematics, right?”
B: "If the context uses the global warming theme, how about it, ma'am?"
N: "Ha?"
B: “The theme, the theme. So you can?"
N: "Oh, the theme?"
B: “Yes, that's right, the theme. No, it's not like SPLDV, for example, usually uses sales. So, if SPLDV, for example, uses the global warming globe, the theme is global warming, that's roughly it or the other materials use the global warming theme, what do you think, what do Miss Upik and Miss Samik think?"
N: "For example, in mathematics, it's not a problem as long as we still have a corridor, right? How to make questions, ma'am. The problem here is, to be honest, to be honest, we haven't gotten there yet, because on the one hand,

it's now set, so it's not that we don't want to give the children material according to the current situation, right? But here we are giving the term students understand, not theoretically, but it's around us too, because, on the one hand, we see children who say that mathematics is a scourge, so it's already scary for them and for them, I'm lazy, especially now that Covid is over, I think ladies and gentlemen also understand the consequences of Covid. We don't turn it on from COVID-19, but the impact is that sometimes we as teachers in class have to be smart, what's it like to encourage children to do more, and develop their brains more? because usually they are used to cellphones like that, you know."

F private high school
A: "Lajeng, sir, if this is the case, we are trying to create a learning model, right? What if we used this global warming phenomenon as a context for mathematics learning, what do you think?"
I: "What do you think about this, sir?"
A: "Which means is it possible or not or what do you think?"
I: "In my opinion, it's quite difficult to relate it, Sir, regarding global warming with mathematics or maybe I haven't thought about what to relate it to, aha. Yes, because it's quite good, sir, I don't know the contextual part yet."
S: "Maybe just a little something, material that we can use as a global warming experience first. So not all mathematical material can be included in global warming, so again, if we can collaborate to get into global warming, there must be certain subjects too. For example, planting, what kind of shape the tree will be, what kind of shape the pot will be, we can calculate it through mathematics, right? Then, let's go back to economics, whether the basic price is economical or not, we can try to get into the economy. Then you can go into geography, you don't need to use a pot, just use soil, whatever the pH of the soil is, that's fine too. Calculating soil pH also uses mathematics mathematics can go anywhere, Sir. But, the science of mathematics but yes, the science of counting, division, multiplication, and measurement can come in there. But for the material itself, we are still guessing there, for example, the material is a matrix, sir."
I: “Matrix, aha”
S: "Ahaha, yes, I am this matrix, sir, I am confused about whether I have the material in real life."
A: "Ahahaha"
S: "Finally, I went back to buying and selling, you know, buying and selling, for example, person A buys wine, person B buys this, person C buys this, then this one buys clothes, this is how the matrix is made. Finally, again, we can combine Lemak with other subjects, but mathematics can't stand alone in global warming. Maybe it's just sine and cosine, in my opinion, how about the height of the tree? Let's try to measure it slowly, from when you planted it like this, to that, it becomes like this, how many months will it be like this, how many months will it be like this, try to relate the height after that At

what time of year does this tree reach this height? Well, that's possible, but the level of material will be different, Ma'am, next month, right? Well, it's back again, we can relate things to other subjects. "It seems like that's all, in my opinion, if it's global warming, it's possible that it could just be, what needs to be studied again, let's think together about how, we, the mathematical material can be included in global warming."
A: "Okay, yes, there is a chance, sir."
S: "God willing, if we want to, why don't we do that, sir? Yes, the name "people" means researcher, who knows, maybe it might come in and it will make it clear to the children why we don't use it like that, you know."
A: "That's what we're looking for, sir. OK, next time, for example, if this is related to this one, yes, it is possible for us to use it as a context. If you think, we use it as a context in learning mathematics later, maybe there will be no benefits for teachers or students when learning mathematics using the context of global warming, although Sir Indra said it was difficult, maybe there is something useful or not for students or teachers?"
S: "If there are many benefits, Sir, we are talking about global warming, which means we will stop global heat, somehow the children will also feel it. We make them aware that global warming is dangerous or we make them aware, let's plant trees together or how do we go green. Yes, we heard that I was teaching about real life and how global warming is, it's hot, sis, you can use the AC, even if the AC is still hot, you're still feeling hot, right? What's the cause of this? Let's find out the cause, right? What's the cause of global heat? What's the cause of global heat? Because there are still many trees being cut down. So what do you have to do? You're like this, we're just directing the child, whether it's going to be in the future, we don't know, sir. Let's just pray for a good child, right? Finally, let's move on because there are many benefits if our children want to push motorbikes like that. But back again, sir, oh if I go back to the nature or character of the child or each person. Because of what? Because there is someone in a good family environment, maybe he knows, oh yes, but if you change the family environment and apologize to those who are lacking or broken, maybe he will be indifferent. That is, it goes back to that, meaning that if I teach, there will be people when we teach, Sir, there will be those who pay attention, others who look away. Oh, that means the one who showed this was paying attention to me chatting, whatever I said, he was digesting it like that. But if people are sleeping, they still need a blow to make things like that. "If we say benefits, there are many benefits when we teach."

The interviews showed that 7 out of 8 teachers stated that there was a possibility of using the global warming phenomenon to realize a low-carbon society in Mathematics learning. However, it cannot be denied that there are difficulties in integrating it into Mathematics learning. According to several resource teachers, this learning plan can provide benefits, especially for students, namely gaining new knowledge related to global warming so

that it is hoped that students will care more about the environment and be more aware of the condition of the earth.

CONCLUSION

The research results show the possibility of using the global warming phenomenon to realize a low-carbon society in Mathematics learning. However, there are difficulties in integrating it into Mathematics learning. It is necessary to develop a learning model that applies global warming to Mathematics learning so its implementation is evident.

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