Reducing the impact of global warming through school based management framework: engaging students’ participation in daily life integrated curriculum

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Abstract. Recent study findings indicate that global warming plays a significant impact on our planet, for instance the raising temperature of earth that affects the melting of polar ice caps. This melting polar ice cap may cause the increasing of sea level, moreover it also causes serious effect for all organisms on earth. The research aimed to describe the ways of reducing the negative impact of global warming integrated into students’ participation in their daily life based on science teachers’ perceptions, beliefs, opinion and ideas. The results are converted into preliminary forms of product in the form of a hypothetical framework of green school-based management. This study was the qualitative research with the methods of Focused Group Discussions (FGD). Based on the result of FGD, school communities and stakeholders have to actively participate in reducing the effects of global warming integratelly and continuously. The form of participation and integration are presented in the hypothetical school-based management framework.

1. Introduction
Recent study findings indicated that global warming plays a significant impact on the earth. Global warming itself can be defined by the increasing of the average temperature on globe [1]. Over the last 100 years, the average of increasing air temperature near the earth’s surface is about one degree celsius [1]. Furthermore, it causes climate change. Another impact of global warming is melting of polar ice caps [1]. This phenomena is the easiest observed phenomena. As we know that our earth has two poles, north and south pole. Others impact caused by global warming are floods, droughts, heat waves, and often tornados [2]; glacial retreat, reduced summer stream flows, and species extinctions [3]; destruction of the ozone layer [5]; and it also impact in agriculutral yield [4]. The major cause of the impact of global warming is caused by human activities which emitting greenhouse gases from burning of fossil fuels [6].

The United Nations Children’s Fund (UNICEF) shows that there are the relationship between Climate Change and Disasters, and Education. Natural disasters caused by climate change can affect the loss of livelihood assets (natural, social, physical, etc), and also reduce children’s time for school. UNICEF also give the examples of adaptation and risk reduction solution through education that are schools are constructed to withstand hazards, introducing environmental education, disaster preparedness, schools install early warning system, and many others activities which can increase
awareness of global warming [7]. Other study find that based on survey to the 107 teachers in Lampung Province, based on teacher perception the negative global warming impact can be reduced by a model which involve student, policy maker, and school’s stakeholders called “Green School Based Management Model” [8].

At Junior High School’s curriculum, especially in Science or Physics subject, there is a special topic which discusses about global warming. It means physics has strong relativity in discussing global warming. Thus, it is possible to integrate or immerse some physics matters with global warming. Unavailability of curriculum which integrate global warming with physics makes this study is should be done.s This study was conducted to reduce the impact of global warming by providing in-depth information on how Global Warming through school-based management framework can be integrated into the design, implementation, and students’ participation in their daily life.

2. Method

Research Design
This is a qualitative research. The research method applied is Focused Group Discussions (FGD). The variable that is the focus of research is the integration of character development both educators and students who are environmentally friendly in learning science in schools by referring to the education curriculum. The FGD results form the basis for determining a preliminary form of product [9] which is part of the development of a green characterized School Based Management (SBM) model [8].

Participants
The subjects of this study were science teachers at junior high schools in Pesawaran District as FGD participants totalling of 24 people. In addition, there were two experts, namely: science education lecturer and education administration lecturer as leaders in the FGD which were divided into two groups (each group was followed by 12 participants).

Instruments and Procedures
The FGD was conducted by referring to the instrument that had been developed as a basis for developing the preliminary form of product. The instrument contains statements relating to anticipating the spread of the negative impact of global warming which is integrated with learning and activities in schools. In detail, indicators of FGD materials are presented in Table 1.

Table 1. Indicators of FGD Material on Anticipating the Negative Impact of Global Warming in Learning

| Indicator of FGD Material                                                                 |
|------------------------------------------------------------------------------------------|
| 1) The views of FGD participants about the contribution of the implementation of the SBM model with a green character to reduce the impact of global warming. |
| 2) Perceptions and predictions about the potential involvement of students and schools in reducing the impact of global warming. |
| 3) If students have the potential to participate in efforts to reduce the impact of global warming, then what kind of activities or management models are possible to do in school? |
| 4) Existing conditions in schools in an effort to reduce the impact of global warming. |
| 5) Potential and opportunities in schools to support efforts to reduce the impact of global warming, especially efforts to integrate with the applicable curriculum. |
| 6) The involvement of relevant parties (stakeholders) who are ready to support schools to participate in reducing the impact of global warming. |
| 7) Coordination system with related parties in supporting schools to participate in reducing the impact of global warming. |
| 8) Problems and obstacles faced by schools to implement SBM models with green character to reduce the impact of global warming. |
| 9) Proposals and hopes for implementing the SBM model with a green character to reduce the impact |
of global warming.

10) Community support for implementing the SBM model with a green character.

In developing preliminary form of product, the steps taken are collecting and analyzing the effects of global warming on life on Earth, analyzing the possibilities of anticipating and minimizing the effects of global warming that can be applied in activities at school, through Focused Group Discussions (FGD) with physics teachers at school. FGDs were conducted in 2 groups, each led by 1 expert. Furthermore, the results of the FGD became the basis to determine the actual steps in learning, and propose these steps to the principal to consider them as school policies and be known by stakeholders. In the end, the initial green school policy as a basis for shaping the character of children and other school members who are environmentally friendly.

3. Results

The FGD begins by providing an overview of the negative effects of global warming to FGD participants by experts. Then, experts socialize the SBM model with a green character as a first step in anticipating the effects of global warming starting at school. As a prelude to the discussion, the expert asked the views of FGD participants about the contribution of implementing the SBM model with a green character to reduce the impact of global warming. A participant from SMPN 13 Punduh Pidada stated:

If we haven't put it into practice, I think it's rather difficult to explain the contribution of this model. However, we do not know how it will turn out. When it is practiced, there will usually be a change from before. Moreover, it will be guided in its implementation. Even so, it will be difficult to implement this model because school management is not yet optimal.

Participant from SMPN 12 Pesawaran expressed the same thing that:

If seen from the condition of schools where electrical installations in the classroom are not available, the application of the SBM model with green characters is not possible. Moreover, student awareness is still low in maintaining school facilities.

Based on these 2 answers, participants assessed that the application of the SBM model with green characters in the learning aspect requires modern technology facilities. In fact, educators can actually take advantage of existing materials in the surrounding environment (local wisdom). Moreover, the use of modern tools that use electricity tends to increase the effects of global warming. In this case, the right approach applied in learning is STEM (Science, Technology, Engineering and Mathematics) Education. Students can utilize the environment to understand the concepts of physics (Science), especially in the matter of global warming. With existing environmental materials to develop simple tools that are environmentally friendly (Engineering). This was recognized by other participant from SMPN 19 Pesawaran who stated:

We, as educators; demanded to be creative in learning. Learning media can be created from used goods that are not used anymore by applying the 3R principle (Reuse, Reduce, Recycle). However, there needs to be support from the school principal who is authorized to decide on a policy. This has been applied in our school. The principal applies rules to reduce the use of plastic in schools.

After the participants understood the role of educators in applying the SBM model to learning, they were asked to provide the latest conditions about the potential involvement of schools in reducing the impact of global warming. A participant from SMPN 2 Pesawaran stated:
In our school, the principal has implemented a policy since the 2019/2020 school year (not just an appeal) that students are not permitted to ride motorbikes to go to school. Apart from pollution, students often play first with friends after learning at school has finished.

In addition, students are also involved in efforts to reduce the effects of global warming. This is as conveyed by participant from 19 Pesawaran SMPN which stated:

Students in our school are required to collect garbage that is littered in the school environment to be placed in the city of waste. This has become a rule set by the principal.

The condition of the school as described by the participants was good enough in cultivating environmentally friendly behaviour in the school. However, it needs to be improved again in aspects that make it possible to shape the students' green character. A participant expressed hopes that might be applied in school:

As the policy adopted by schools in Bandar Lampung, students are required to bring supplies (food or drink) in lunch boxes and drinking bottles that can be reused, not just disposable packaging.

Different participant added:

Educators need to increase the awareness of students to behave environmentally friendly. For example, student often discard snack packaging trash carelessly. In fact, at a distance of 1 meter from him there is a trash box. This is also an obstacle faced so far.

Furthermore, a participant explained that environmentally friendly actions contained in the education curriculum:

In the curriculum, there are craft subjects that require students to make art from used goods. Based on the Student Basic Data (Dapodik), educators who are in charge of these subjects must be linear with the field of Natural Sciences. However, students' work is still only for personal consumption (not yet of economic value). Now it's stalled, nobody takes care of it anymore.

Aside from being a lesson, schools also facilitate students to develop their potential through extracurricular activities. This was as explained by a participant:

Our school organizes extracurricular activities in agriculture. Examples of plants that are cultivated are cassava. Proceeds from extracurricular activities are sold commercially and the income received goes into the school cooperative's treasury.

The same thing was explained by a participant at another school related to greening at an economically valuable school:

The important thing is to be consistent. We (meaning school residents) had time to plant lettuce (one example) with the hydroponic method. The results are quite satisfying. However, this only takes place during the 2 harvest periods. So, it is very difficult to remain consistent in carrying out greening programs in schools.

The statement shows that there are problems and obstacles faced by schools to implement the SBM model with a green character to reduce the impact of global warming. A participant said:

Perhaps, the obstacle is school management. For example, the principal asks one teacher to be responsible for a particular program. However, he did not carry out his duties properly.
Thus, the need for school-based management that focuses on greening in the school environment. In addition, commitment and support from all school members is needed to remind, motivate and complement each other in the implementation of the program. In addition to school residents, the involvement of relevant parties (stakeholders) in participating to reduce the negative impact of global warming. A participant expressed his opinion:

In the school environment, the party who also needs to play a role is the canteen manager. Cafeteria managers use environmentally friendly snack packaging or packaging that can be used repeatedly to stop using plastic packaging in schools.

Other participant added:

Parents of students can also participate. For example, by donating plants to be planted in schools. Communities around the school environment can also participate by maintaining environmental hygiene and health. This will give a good example to students so that students also feel embarrassed if littering.

This shows that all parties who have an interest in the school must be actively involved and work together to create an environmentally friendly school. Therefore, the school needs to collaborate with the local government to socialize the cleaning program, especially in the educational environment. This will foster public awareness of a green, clean and healthy environment. Thus, the sustainability of environmentally friendly schools is maintained and getting better.

After the FGD was conducted with physics teachers in one of the districts in Lampung Province, a number of data were obtained which were then grouped into 3 categories as follows.

**FGD Results to be Submitted as School Policy**

School policy is an important aspect in shaping the green character of all school residents because it is the basis for carrying out activities at school. Therefore, it is necessary to develop policies that support the realization of a green school with the following policy details.

1. Enacting a policy of bringing lunch with non-plastic drinking bottles and lunch boxes to school so that students reduce the use of plastic when buying snacks during breaks.
2. Encouraging students to walk less than 1 km from the school so that the use of motorized vehicles is reduced so that emissions can be reduced.
3. Recycling used plastic to be used as a display or an object of economic value.
4. Familiarizing yourself to pick up trash that is not in place after school hours are over.
5. Holding a school bus to pick up and drop off school children whose location is far from school in order to reduce the use of private vehicles.
6. Carrying out extracurricular activities in agriculture, either through direct planting in the field or with a hydroponic system.
7. Urging or requiring the use of environmentally friendly snack packaging or packaging that can be used repeatedly to stop the use of plastic packaging in schools.

**FGD Results for Applied in Learning as Part of the Curriculum**

Students at school are the subject of learning. That is, most of the activities are learning. Therefore, learning applied must lead to the formation of green characters. Input points are given as follows.

1. Implementing learning with the STEM Education Approach in learning.
2. Utilizing local natural resources as tools and materials to make teaching aids to support learning which is an aspect of STEM Education (Engineering).
3. Organizing learning in craft subjects by utilizing items that are not used as media for work.

The results of the FGD as a Parent’s Guide in Educating Environmentally Friendly Students Integrated with the Curriculum
The family is a place where students generally spend the most time. The points that are of concern to parents while with children are as follows.

1. Giving a good example and monitor children in the use of electricity at home by turning off the lights if the room is bright, unplugging the charger when not in use, pulling out any plug when not in use, turning off electronic devices not using the remote control.
2. Instilling the habit of planting trees or plants in children in the yard.
3. Familiarizing walking when leaving for the mosque and places close to home (radius less than 500 meters).

Based on the FGD results, the researchers developed a school-based management framework as shown in Figure 1.

![Hypothetical Global school-based management framework](image_url)
4. Discussions
The impact of global warming has been felt by all humans and natural systems, such as weather events on the surface of the Earth [10], for example is an increase in the effects of heat in urban areas, extreme weather and sea level rise [11]. Thus, all have a role to reduce the negative impact. The main key in implementing these roles is individual character. Character development must start early. At an early age, the best places to form environmentally friendly characters are families and schools. Therefore, schools and families need to understand their role in anticipating the negative effects of global warming by forming the character of future generations.

The role of schools and families is a way to build character in a sustainable manner so as to create people who are environmentally friendly. This becomes the basis for individuals to be willing to make decisions and act in maintaining and improving environmental sustainability, both in the home, school and community environment [12, 13]. The two integrated components will spur students to always improve and maintain environmentally friendly behaviour.

Schools can impose a policy of bringing lunch with non-plastic drinking bottles and their own lunch boxes to school so that students reduce the use of plastic when buying snacks during breaks. Thus, the amount of plastic waste that takes a very long time to decompose naturally can be suppressed. Even so, the use of plastic in daily life cannot be eliminated. The solution offered for this condition is to recycle used plastic to be used as a display or economic value item. In addition to reducing environmental pollution, this will also increase students' creativity. Furthermore, if waste can no longer be recycled, the school needs to issue a policy for students and school residents to take out inappropriate trash after school hours.

The role of schools can be expanded by encouraging students to walk less than 1 km from the school. In addition, hold a school bus to pick up and drop off school children whose location is far from school. This was done to reduce the use of private vehicles. The fewer motor vehicles that operate, the less emission gas is produced. Moreover, students generally tend to obey more school rules or policies compared to verbal instructions from the family. Therefore, the school approach through policy is an effective medium for directing students who are pro-environment [14-15]. Thus, environmental education will run more effectively.

School policies may not touch upon increasing students' understanding of global warming. In this gap the teacher plays an important role, especially in learning. The results show that students tend to associate climate change with rising temperatures so that the thoughtful way to anticipate it is by not polluting the environment [17]. They are limited that the causes of climate change are increased pollution [17-19] and carbon dioxide levels as greenhouse gases, not other gases such as methane, chlorofluorocarbons (CFCs), nitrous oxide, or tropospheric ozone [20-22]. Furthermore, at a higher level, such as students in the field of science studies; have an understanding that is not significantly different from individuals in general [21]. In fact, global warming is not that narrow.

In addition, students also do not understand that electricity (energy sources) that are used at home as a cause of climate change [19]). Even so, there are also students who understand that nuclear use is another factor that causes climate change [23]. Therefore, teachers need to instill and improve students' awareness of global warming in learning. This can be started by determining indicators of learning outcomes that are part of the curriculum. With clear indicators, the teacher will more easily describe the steps of learning.

Appropriate learning, in this case; one of which uses the STEM Education approach. STEM Education provides opportunities for students to instil true concepts (Science) by utilizing technology (Technology). Students are also skilled in designing teaching aids that utilize natural energy that is environmentally friendly (Engineering) by applying the concept of measurement and calculation in the manufacture of precision products (Mathematics) [24-25]. In its implementation, teachers who have experienced or have integrated curriculum training, especially related to the topic of global warming, can provide targeted assistance to other teachers through a periodic and continuous scaffolding process, so that all teachers can carry out integrated learning independently in their classroom [26].
Another supporting factor for creating students' environmentally friendly character is family attention. The family is the first environment and the place where students generally spend the most time in life. Therefore, in order for environmentally-friendly habits to continue to form one character, families need to be involved as supervisors and mentors for the implementation of learning. Thus, the education curriculum also needs to be integrated with everyday life, especially in the family environment. This can be started by parents by giving good examples and monitoring children in the use of electricity at home, such as turning off the lights when the room is bright, unplugging the charger when not in use, unplugging any plug when not in use, turning off electronic devices not using a remote control. Another good behaviour is to instil the habit of planting trees or plants in children in the home yard. Thus, air pollution generated at home can be immediately neutralized. In addition to health, getting used to walking when going to the mosque and places close to home (radius less than 500 meters) is an environmentally friendly action [27-28].

5. Conclusion
Based on the result and discussions, school communities and stakeholders have to actively participate in reducing the effects of global warming integratedly and continuously. The participation begins in the classroom environment where students are acquired concepts, attitudes, and skills in creating beautiful and clean classrooms. In the school environment, school principals and teachers create a conducive school work environment for school residents to become a comfortable school. Furthermore, at the level of government bureaucracy, the bureaucrats set policies that support the formation of a school management model that is able to adapt to global issues that must be addressed together with every human being in the world. The form of participation and integration are outlined in the hypothetical school-based management framework.

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