

*Use of Contextualized Activity Sheets in Improving Students' Knowledge
on Climate Change*

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Abstract

As a major global issue, climate change is one of the topics in the senior high school curriculum, specifically in the Earth Science subject. Designing instructional materials in which the learners can relate their personal experiences to climate change plays an important role in enriching their knowledge about climate change. This paper aims to develop and evaluate the use of contextualized activity sheets to improve grade 11 students' knowledge on climate change using the PDSA framework. The researcher-made contextualized activity sheets are composed of six activities anchored to the Department of Education (DepEd) learning competencies. Experts in the field of science education and environmental science validated the contextualized activity sheets, where an overall mean rating of 4.51 is interpreted as Very Acceptable. In addition, pre-test and post-test on the climate change concept test were administered to 157 students to measure the students' knowledge. The results showed that the use of the contextualized activity sheets has a significant difference on the students' knowledge on climate change from the pre-test and post-test, while the Cohen's d result indicated that it has a medium effect on students' knowledge. These results suggest that the contextualized activity sheets can enrich the students' knowledge on climate change and can still be enhanced to suit the needs of other learners from different localities.

Keywords: Climate Change, Contextualization, Knowledge

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Introduction

Climate change is defined as a long-term change in the state of Earth's climate, or a region caused by changes in the greenhouse gas concentrations in the atmosphere either due to natural phenomena or anthropogenic causes (Cruz et al., 2017). To address this global issue, several scientists have proposed two main strategies, namely: mitigation and adaptation. As an effort to mitigate climate change, the United Nations Framework Convention on Climate Change (UNFCCC) issued a protocol which encourages the developed countries to make the first move to reduce their greenhouse gas emissions and help the developing countries to the same. However, for these efforts to be deemed successful, all levels of society should act and to make it happen, transfer of appropriate knowledge must be done (Anderson, 2010; Ledley et al., 2017). To reach such a wide community, a powerful tool such as formal education in schools is needed.

Although most people claim that experience is the best teacher, in the case of climate change, learning from experience will require decades and even millennia. In a span of months, formal education in schools can excellently convey appropriate knowledge and promote learning that leads to action of the young generation of students (Garcia, 2015; Harun et al., 2011). In the Philippines, the study of Nuñez & Clores (2017) found out that K-10 completer have a moderate level of environmental literacy and environmental knowledge. They have argued that environmental education among Filipinos is a necessity so that students can participate in conserving and protecting the environment. Thus, the DepEd developed the Climate Change Education for Sustainable Development modules to use visual materials in stimulating impactful discussion on climate change.

Thus, this paper aims to fill the gap between the need to connect the students to local climatic conditions and the effort of DepEd in developing modules for climate change through contextualization. Contextualization is defined as the process of developing new skills and knowledge among students through presenting subject matter and using authentic materials which are meaningful and relevant to them (Ballesteros, 2015; Garin et al., 2017). It is the assumption of this study that after the implementation of the contextualized climate change activity sheets, there will be an increase in the students' knowledge on climate change.

The need to contextualize learning materials used in teaching was presented in several research in the Philippines. In other disciplines such as Mathematics and Languages, it was argued that teachers need to localize examples, exercises, and illustrations to improve students' performance (Egcas et al., 2017). Hence, this approach can also be used in Science not only to enhance the performance but to promote lifelong learning as well.

Conclusion

Materials and Methods

The study employed an action research design using a quasi-experimental approach. All the participants were subjected to the intervention, the use of the contextualized activity sheets. The quantitative data were collected from pre-test and post-test of the Climate Change Concept Test and were analyzed using the Statistical Package for Social Science (SPSS) software to determine the mean and standard deviation, as well as if there is a significant difference between the pre-test and post- test scores. 154 students from the four sections of Grade 11 students of De La Salle Medical and Health Sciences Institute Special Health

Sciences Senior High School (DLSMHSI-SHSSHS). The module implementers on the other hand were two Earth Science teachers in the school.

Prior to the implementation of the activity sheets, the student participants took the Climate Change Concept test to determine their initial knowledge about climate change. The activity sheets were implemented in October 2020 of the school year 2019-2020 for two weeks. At the end of the implementation, the students took the Climate Change Concept test again to determine the level of their knowledge about climate change.

Results and Discussion

The average pre-test mean scores (Table 1) of the students show that they have a moderate level of knowledge about climate change before using the contextualized activity sheets. It can also be observed that most of the students are somehow familiar with the topics under climate change.

Table 1: Students' pre-test scores on the climate change concept test

	Mean Score	SD	Verbal interpretation
Factors affecting climate	8	1.92	High level
Global climate phenomenon	7	2.15	Moderate level
Overall	15	3.36	Moderate level

Table 2 shows the pre-test and post-test results the students. It can be observed that the use of the contextualized activity sheets helped the students understand the topic better. As a result, their performance yielded high post-test results.

Table 2: Changes on students' knowledge about climate change

Pre-test mean	SD	Post-test mean	SD	t	Cohen's d	p-value
15.29	3.36	17.54	3.18	-9.45	0.69	0.0000...

Moreover, the p-value is less than 0.05 which indicates that there is a significant difference between the mean score of the pre-test and the post-test. It can be inferred that the students' knowledge about climate change improved after using the activity sheets. The Cohen's d value, on the other hand, is 0.69 which shows that the contextualized activity sheets have a medium effect on students' knowledge test. This implies that the materials have average impact on the improvement of the scores in the given concept test about climate change.

These results further proved that contextualizing the activities plays an important role in enriching the students' knowledge. The students were able to understand the relationship between what is being learned in the classroom and what is being seen in the real-world. In a similar study about contextualization, Giamellaro (2014) observed that there was an increase in the students' conceptual understanding in science when an authentic context was given (Giamellar, 2014). A study of Rivet & Krajcik (2008) also implied that contextualization in a science classroom is a way to facilitate the improvement of students' understanding of

difficult science concepts. These are because in contextualization, students have a personalized and first-hand perspective in what they are learning.

The use of contextualized activity sheets can be included in the teachers' strategy for teaching climate change to provide an authentic way for the students to understand the topic better. This can also open a room for discussion among stakeholders to consider the local conditions which can also be included in the materials.

Recommendations

Through the use of the activity sheets, the students who don't have access to the online resources which can help the understand climate change better can be given opportunities to use these kinds of materials. As a result, they are more involved in the learning process since their experiences are taken into consideration in designing the instructional materials. As seen from the results of this study, the use of such materials improved the students' knowledge on climate change.

From the implications of the results, the following suggestions can be done in the future studies, (1) teachers can work with other stakeholders such as school administrators and government agencies to modify these materials with a locality-specific context in mind, (2) the discussion of the concepts can be provided to develop a module which students can use at their own pacing., (3) The contents of the contextualized activity sheets can be modified by other educators to suit the needs of the learners in the lower grade levels, and (4) the activity sheets can be made available in different platforms to make it more accessible to the teachers and the learners who are currently adapting to the changes brought about by the pandemic.

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