

Designing and development practical model for climate change education

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Abstract

Today climate change has become a primary concern of scholars in the natural sciences, particularly climatologists and the environmentalists. In the future, improving environmental education will be an essential task for dealing with climate change effects for most of the developing countries. In this study, the 'proper use of water' education is considered as a field of environmental education. The students are key persons in dealing with the effects of climate change on water resources so they should be educated and trained for adaptation to it. In order to enable the students develop their environmental literacies, the authors of the paper collaborating with the teachers to develop a plan for learner-centered on integrated subjects' map of education for the water consumption. The participants were 18 teachers and 254 students from 4 primary schools in Tehran. After receiving the opinions of the participants, the practical model was designed and study conducted in the five steps. This Project had been able to promote responsibilities as well as cultivate intrinsic environmental literacies among the students.

Key words: Environmental Education, Climate Change Education, Practical Plan, Effects.



Introduction

Climate change is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time. Climate change may refer to a change in average weather conditions, or in the time variation of weather around longer-term average conditions. The change is measured by changes in features associated with average weather, such as temperature, wind patterns and precipitation. Climate change occurs when the climate of a specific area or planet is altered between two different periods of time. This usually occurs when something changes the total amount of the sun's energy absorbed by the earth's atmosphere and surface (National Research Council, 2009).

The changes can be caused by natural processes like volcanic eruptions, variations in the sun's intensity, or very slow changes in ocean circulation or land surfaces which occur on time scales of decades, centuries or longer (Arnell et al, 2005; Schellnhuber et al, 2006; Schneider, 2009; New et al, 2011; National Research Council, 2009), but Most of the contemporary concern about extreme climate change is associated with anthropogenic global warming (Hansen et al. 2012; William and Travis, 2013).

Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 (IPCC, 2007a; Cui et al., 2011; Rubio et al., 2011; Lorenzo et al., 2011; Zou et al., 2011), humans cause climates to change by releasing greenhouse gases and aerosols into the atmosphere, by changing land surfaces, and by depleting the stratospheric ozone layer (krischbaum et al 1996; Ravidranath, and Sukumar,1998; Ashrafi et al, 2012; Kiehl, 1997; National Research Council, 2007; Arnell et al, 2005; Schellnhuber et al, 2006).

Today climate change has become a primary concern of scholars in the natural sciences, particularly climatologists and the environmentalists (Azizi, 2002; Paoletti et al, 2007; Roshan et al, 2009).

In the past decades, political and scientific societies have conceded that human activities 'might' induce climate change. Today, scholars believe that the human role in the excitation of the greenhouse effect is undeniable. This, however, is not to lay claim to the notion that the greenhouse effect is an incident restricted to the recent past years, but rather to suggest that the process has manifested itself more clearly as a result of the increase in greenhouse gases which can be attributed to the activities of the recent past years.

Climate change is a phenomenon we can no longer deny as its effects have become increasingly evident in Iran and other regions of world (Dastorani and Poormohammadi, 2012; Kirono et al, 2011, Roshan et al, 2010).

Water and climate have a close relationship and the more this relationship fall out of balance, the more jeopardizing water resources. As the earth's temperature continues to rise, we can expect a significant impact on our fresh water supplies with the potential for devastating effects on these resources. As temperatures increase, evaporation increases and sometimes resulting in droughts (Abbaspour et al, 2009; Nunes et al, 2009, Caballero, 2007; Gosain et al, 2006; Fontaine et al, 2001).

For poor countries that have always faced hydrologic variability, climate change will make water security even more difficult and costly to achieve. Climate change may also reintroduce water security challenges in countries that for a hundred years have enjoyed reliable water supplies and few, if any, water shocks (Cuo et al, 2009; Schuol et al, 2008, Jyrkama and Sykes, 2007). Thus developing of an educational plan is essential to adapt with climate change effects on water resources.

Education is an essential tool for achieving sustainability and plays an important role to solve those problems (McKeown, 2002). Teaching and learning on environmental education is necessary. It is needed to teach students to act for the environment (Jickling & Spork, 1998; Thathong, 2010).

Environmental education is a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, 1978).

This study seeks to offer a plan for development of environmental education activities for adaptation with the effects of climate change on water resources in primary schools.

Material and methods

The students are key persons in dealing with the climate change so they should be educated and trained to develop intrinsic environmental awareness in preservation of water resources. In order to enable the students develop their environmental literacies, the authors of the paper collaborating with the teachers to develop a plan for learner-centered on integrated subjects' map of education for the water consumption: topic "the proper use of water" which entailed placing the proper water consumption at the heart of the learning activities.

It was anticipated that such a plan would make the students appreciate the environment and value the water resources. The participants were 18 teachers and 254 students from 4 primary schools (in each of these primary schools, two class was selected) in Tehran.

Table1. Demographic information of the sample

	Male	Female	Total
Teachers	9	9	18
Students	125	129	254

Result and discussion

Practical plan: the research was conducted according to the following steps:

- The researchers chose participants and proposed a project 'the proper use of water'. The researchers and the teachers developed learner-centered on integrated subjects' map of education for the water resources: the proper use of water (Fig.1).
- Learning activities according to the integrated teaching plans were developed. The students were required to have their own portfolios to keep track of the progress; the portfolios constituted a form of assignments, which would be eventually graded as part of the learning development activity.
- The researchers provided the students with a plan for water consumption (150 liters per day, for different purposes, include drinking, bathing and ...); the students were solely responsible for proper use of water.
- Every week, the students collected data and reported the use of water according to the assigned activities. The researchers, teachers and research assistants monitored the study.
- The researchers and the teachers used the opinions, observations and conclusions regarding the implementation of the plan to improve and refine the learning activities plan, so that the plan became more complete.

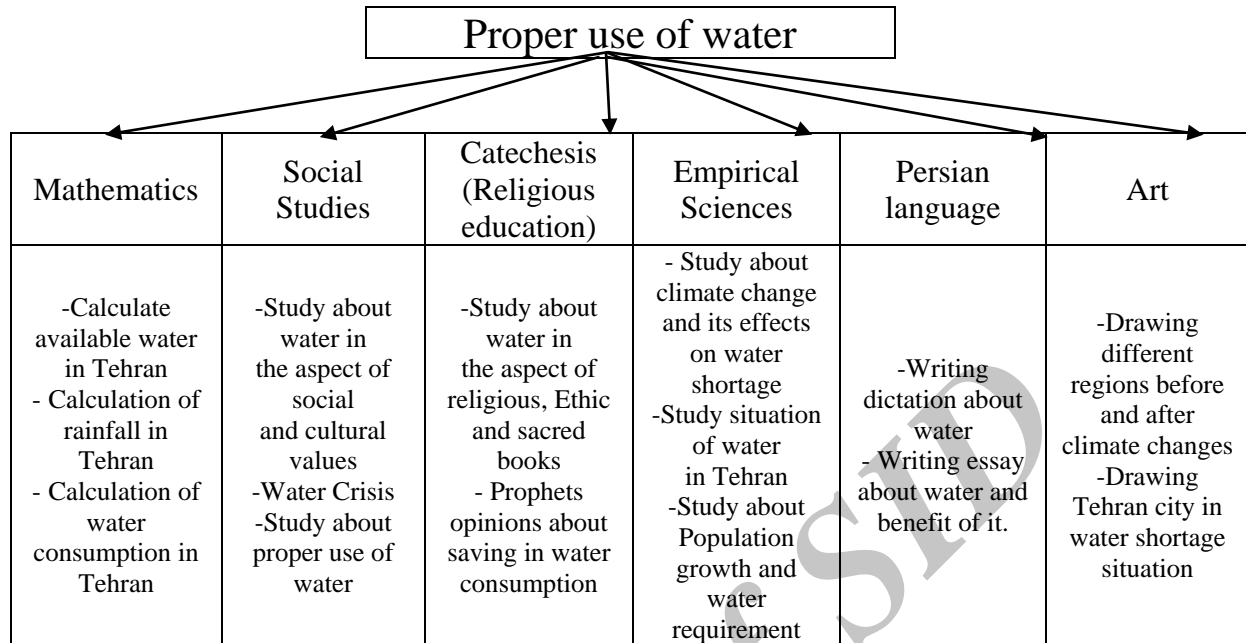


Fig.1: A chart of integration teaching about proper use of water

Conclusion

Today climate change has become a primary concern of scholars in the natural sciences, particularly climatologists and the environmentalists. In the past decades, political and scientific societies have conceded that human activities ‘might’ induce climate change. The expansion of urbanization and the development of cities along with population increase and expansion of industrial activities and irregular consumption of fossil fuels have given rise pollution and also have changed natural environment and climate. As temperatures rise, people need more water to maintain their health and thrive. Many important economic activities, like producing energy at power plants, and growing food crops, also require water. The amount of water available for these activities may be reduced as earth warms, and therefore competition for water resources increases. In many areas, climate change is likely to increase water demand while shrinking water supplies. This imbalance would challenge water managers to meet the needs of growing communities.

In this study, water consumption education is considered as a field of environmental education, and the impacts of effective education related to water consumption pattern on reducing demands are quite clear.

The methodology and strategies used in this study seemed to have equipped the students with good knowledge and an appreciation of the societal, environmental and personal values of the climate change. ‘Proper use of water Project’ had been able to promote responsibilities as well as cultivate intrinsic environmental literacies among the students. Therefore environmental education activities is a way to adapt with the effects of climate change on water resources.



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