

What are teachers' opinions about including topics of natural events and their risks in primary curriculum in Kocaeli (Turkey)?

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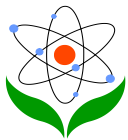
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Contents

- [Abstract](#)
 - [Introduction](#)
 - [Method](#)
 - [Findings](#)
 - [Conclusions and Discussion](#)
 - [Suggestions](#)
 - [References](#)
-

Abstract

Community awareness must be increased for communities to play an effective role in the mitigation of disaster damage. Education is the most effective way to



accomplish this. It is important for people to know that even though they cannot intervene or prevent such events, they can take precautionary measures to reduce the damage caused by disasters. Therefore, the opinions of teachers in primary science education about these events and their risks are critical since they are responsible for teaching children about these important issues. The study group of this research included science and technology teachers in 2011 in Kocaeli-İzmit, and semi-structured interviews with teachers were conducted. This study was conducted with the working group of 20 volunteer teachers on their appointment dates only. First, the science teacher guidebooks published by the Ministry of National Education were examined. Units and learning outcomes about the risks created by natural disasters and "Safe Living and Disaster Prevention" interdisciplinary learning outcomes have been identified. According to the results, half of the teachers interviewed think that education about natural events and disasters should really be a part of the Primary Science and Technology Program, but that unfortunately it is not.

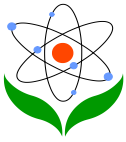
Keywords: nature events, risk of disaster, science and technology curricula, science teacher

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Introduction

Since 2000, an increasing number of studies have been done in an attempt to reduce the risk of natural disasters in our country. It is essential to take an active role in disaster management, and the most effective way to increase public awareness is education. According to Hays (2007), all societies need to know the geographical features of their regions, take lessons from the past events, recognize the causes and the resulting damages of past natural events, and learn about ways to reduce such damages.

According to Karancı (2007), it is important for communities to be prepared for disasters. They must conduct risk assessments and have a plan of action and the necessary skills and resources. According to Kadioğlu (2005), communities that are prepared for disasters through education are best assured of their safety. People's



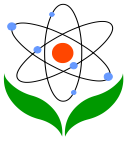
misperceptions about disasters need to be changed, and a common standard in education and training needs to be put into practice. Education programs need to be designed that change community behaviors, build a culture of preparedness, and increase awareness of the risks of natural disasters (Macaulay, 2007; Karnawati & Pramumijoyo, 2008).

Shaw and Takeuchi (2008) in Saijo recommend the use of "Landslide risk mitigation for sustainable community disaster education and training at work" to be used for educating communities focusing on "communities of practice." Macaulay (2007) believes disaster training is very important for students. Through decision-making, critical analysis, and risk assessment they will acquire basic knowledge and skills, and this training must take place in connection with scientific and academic programs.

In our country (Turkey), there are many informal events organized by civil society organizations on disasters, but for widespread impact and to ensure continuing education, a more formal approach is needed. Tsunozaki (2008) conducted a study to determine the most effective way to reduce damages and disasters in the future and concluded that disaster education should be included in school programs.

There is a variety of scientific studies supporting the importance of disaster education in schools (Chang, 2005; Cardona, 2007; Singh, 2007). Proponents of disaster training encourage a more collective approach to reduce societal risk. Natural events that take place in another region may expose to risk individuals with the reason of the geographical mobility if they live in a country with a large population. Therefore, disaster training is required for national education programs (Cardona, 2007). In a trial in the Caribbean aimed to reduce the risk of disasters and to prepare for them, schools were found to play an effective and a leading role (Morissey, 2007). In another study in India, natural and environmental disasters have been included in school curricula in the last 10 years and more materials are being developed. Although floods, droughts, and wind have been issues in India in the past, as a result of the earthquake in the state of Gujarat in 2001, earthquakes have since received more attention than other natural disasters from the Indian government, and research centers throughout the country have made large investments in technical and scientific education (Singh, 2007).

Tsunozaki (2008) conducted a study in Sri Lanka and the Maldives after a tsunami in the Indian Ocean on December 26th; 93.5 % of participants from Sri Lanka and

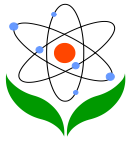


82.5% of participants from Maldives had never heard anything about a tsunami before the disaster. On the other hand, one 10-year-old student girl living in Phuket had learned about tsunamis in school. She noticed the withdrawing movement of the sea and alerted her parents and people around her of the possibility of it being a tsunami and she saved the lives of hundreds of people. This shows us the importance of education to prevent extensive damage as a result of such disasters.

When primary programs are analyzed, especially life science, social studies, and science and technology courses including the topic of natural disasters, a key factor for reducing the risk of disasters is to have scientific knowledge about the subject. It is not possible to prevent people from experiencing events of a scientific nature, but to minimize losses it is important to know some of the measures that can be taken. Japanese students from elementary up to high school have a learning program about science and natural disasters and their impact on human beings, science/the environment, technology, and society in general. At the end of the 1990s, many important curriculum materials were designed for Japanese schools, as being prepared for natural disasters depends on the knowledge children gain from cultural awareness programs in schools (Sasaki and Yamakawa, 2007). Generally, it is estimated that there is a 90% probability that there will be a big earthquake in the next 50 years. However, this does not mean, that will happen tomorrow or be after 50 years. (Pararas-Carayannis, 2007).

Turkey in particular is one of the world's most disaster-prone countries. It has witnessed devastating natural disasters in recent years, including droughts, floods, earthquakes, and landslides. A disaster management system has not been applied in our country as an effective way to reduce the losses occurring as a result of such disasters (Kadioğlu & Özdamar, 2008; Öcal, 2010). In 1999, the city of Izmit in northwestern Turkey was struck by an earthquake with a magnitude of 7.4. Three months later, the city of Düzce in northwestern Turkey was struck by another earthquake with a magnitude of 7.2. The Marmara earthquake has caused significant social, economic, and psychological problems for many people (Kadioğlu & Özdamar, 2008).

In the literature, opinions of science teachers about the learning outcomes with related to the risks created by nature events are examined being quantitative. (Buluş-Kırıkkaya, Oğuz-Ünver, and Çakın, 2011). According to this research, learning outcomes are so much important for teachers. But learning outcomes could not be performed exactly by teachers. In this study, Science teachers' views were



investigated to whether or not sufficient to the risk reduction in terms of awareness, about learning outcomes of science programs related with the risks created by natural events problems in the realization of learning outcomes.

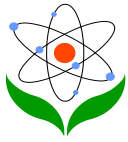
Method

Science and technology teachers in Kocaeli-Izmit were selected as the participants in this study. This study was conducted in 2011 with the working group of 20 identified volunteer teachers on their appointment dates only. First, the science teacher guidebooks published by the Ministry of National Education were examined. Units and learning outcomes about the risks created by natural events and "Safe Living and Disaster Prevention" interdisciplinary learning outcomes have been identified. In the 6th grade Science and Technology program, only the topic of erosion is being taught to students. In the 7th grade program, the risks posed by natural events are only being taught in an indirect and superficial manner. The largest topic about the risks posed by natural events is seen in the last unit of the 8th grade Science and Technology Program as "nature processes".

In this part of the research study, semi-structured interviews with teachers were conducted. The interview the form approach was adopted. This approach allows for flexibility in terms of time and a way to organize the data analysis. Three science and technology teachers were interviewed about this questions while be preparation the open-ended questions in this form. The researcher explained the purpose of the interview. She gave reassurance to teachers related with the remain confidential of interviews. All interviews were done in a comfortable and natural environment for teachers. Interviews were recorded with their permission. In addition, the researcher took notes to facilitate data analysis.

Teachers were asked the following questions in the interviews:

1. What do you think about the existence of the topics of natural events and the disasters they cause in the Primary Science and Technology Program? Should they be included? Do you think they are adequately covered?
2. Do you take interdisciplinary learning outcomes such as safe living and disaster precautions into consideration while teaching in the Primary Education of Science and Technology Program? Do these learning outcomes need to be included in the Science and Technology Program? Why or why not?



3. What are the major problems you have encountered while teaching about natural events and the disasters they cause in the Primary Science and Technology Program?
4. What methods do you use to overcome such problems?
5. What do you suggest to make teaching of the topics more effective in the Primary Science and Technology Program?

Descriptive analysis method was used to analyze the data. The data obtained was analyzed separately and are written. It was created a coding key as bringing together of similar answers for each questions. In order to determine the reliability of coding key, randomly selected five interview form were reviewed by two separate researchers. With this technique, the framework for data analysis was formed based on the research questions. According to this frame, the data will be organized under the themes identified. The findings were defined with the frequency and percentage values and after reading and organizing the data. They were supported with the direct quotations as seen necessary. The number of participating in this study was 20. However, teachers reported many views for the questions to be included in more than one category. For these teachers' opinions of (N) are encountered more than 20.

Findings

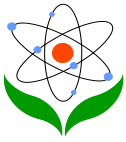
All of the findings and themes observed from the open-ended questions are described below. Direct quotations are chosen according to their high frequencies.

1. "What do you think about the existence of the topics of natural events and the disasters they cause in the Primary Science and Technology Program? Should the topics be included? Do you think they are adequately covered?"

Table 1 shows the teachers' responses to this question.

Table 1: Teachers' opinions about the subject of natural disasters being taught in the Primary Science and Technology Program

Answers	f	%
The topics are discussed; included in the curriculum. They certainly must be. However, I do not think they are adequately taught.	13	65
They are adequately included, but not updated.	3	15



Yes	Topics are included in the 8th grade curriculum, but I do not think that it is necessary to teach them.	3	15
	Topics are included. It is not a must, though. I do think they are adequately taught.	1	5
	Total	20	100
No	Topics are not included in the program.	-	-
	Total	20	100

When Table 1 is analyzed, it becomes clear that all of the teachers are aware that the topics of natural events and their risks are included in the Primary Science and Technology Program, though more than half of them (65%) think these topics must be included and that they are not currently being taught at an adequate level. Another 15% of the teachers think the topics are currently being taught adequately, while another 15% think they should be updated.

Here are several examples of participants' responses to the first question:

T9: *"These topics are included in the science curriculum for 6th, 7th, and 8th grades. Most of them are mentioned in the book, but their actual application in the classroom is so inadequate. It should be more and more exercises certainly."*

T12: *"Yes, these topics are taught, but not adequately. They must be discussed. In particular, the reasons for preventing disasters should be grasped more efficiently by the students."*

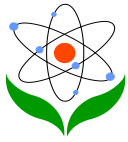
Participant teachers who stated that these topics should be updated said the following:

T13: *These topics are taught. There is an adequate amount of information, but it would be good to update it."*

T19: *"Yes, these topics are taught. When the occasion arises, we teach these topics in 6th, 7th, and 8th grades, but the topics need more attention to become adequate."*

T15: *"They are included in our program adequately."*

T3: *"This topic only has been included in the last unit of the 8th grade curriculum. There aren't enough in 6th and 7th grades. Many topics about disaster aren't seen relevant to science lesson. More relevant to social studies lesson. I think that science and technology course program is already intense. Actually, these topics are not so necessary for this course."*



2. Do you take interdisciplinary learning outcomes such as safe living and disaster precautions into consideration while teaching in the Primary Education of Science and Technology Program? Do these learning outcomes need to be considered in the Science and Technology Program? Why or why not? Table 2 shows the findings related to teachers' responses to this question.

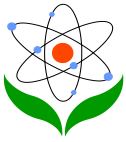
Table 2: Teachers' opinions about interdisciplinary learning outcomes in the Science and Technology Program

	Answers	f	%
Yes, I take them into consideration	They should be added to the science program.	5	25
	They should not be added to the science program. They should be separate.	2	10
	They should be added to the other lessons. They should remain interdisciplinary.	1	5
	They can stay as they are now. I do not put an emphasis on discriminating between the science discipline and interdisciplinary outcomes.	1	5
	They should be added to the social sciences program.	1	5
No, I do not take them into consideration	I cannot take interdisciplinary learning outcomes into consideration because there is not enough time. If science course hours are increased, it can be added to the curriculum as a science topic.	9	45
	I do not take interdisciplinary learning outcomes into consideration, but they should be added to the social sciences program.	1	5
	Total	20	100

As it is clear in Table 2, half of the teachers said that they took interdisciplinary learning outcomes into consideration in the Science and Technology Program while the other half did not. Moreover, 45% of the teachers expressed that they could not take these learning outcomes into consideration because of the lack of time.

Teachers who reported taking these learning outcomes into consideration said the following:

T8: "Yes, we do take the learning outcomes into consideration. The time is also adequate, but how much the students grasp the seriousness of the subject remains open for discussion. Students are reading the book, and we are teaching them



what they should do during an earthquake, during a landslide, and at home. We are teaching them precautions that should be taken before disasters in a short period of time. In my opinion, rather than interdisciplinary learning outcomes, it is better to teach a particular topic as a whole in detail."

T11: "We already know the learning outcomes before coming to the classroom, and we are checking them from time to time. We do actually teach the subject with the learning outcomes. I think, It shouldn't be a separate discipline. Because, one of the fundamental aims of science is to teach students how to solve natural problems they can be exposed to by using a scientific perspective."

Teachers stated that they did not take interdisciplinary learning outcomes into consideration due to the lack of adequate time as follows:

T3: "Unfortunately, we cannot teach according to interdisciplinary outcomes due to the lack of time. We almost rushed to teach even the last unit. This is why we did not have the opportunity to be honest."

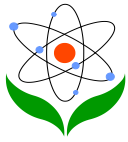
T4: "Interdisciplinary learning outcomes aren't emphasized enough. These interdisciplinary activities must be realized more effectively, but students don't come to class prepared for these activities. You cannot have the chance to change them. For this, of course, these learning outcomes can more easily be added to the real learning outcomes."

T16: "There are a lot of exercises in the students' books and in the workbooks during the whole semester. Also there are alternative exercises in our teachers' books. But we do not have adequate time to teach all of these exercises, only there is limited time."

3. What are the major problems that you have encountered when teaching about natural events and the disasters they cause in the Primary Science and Technology Program? Findings related to teachers' responses to this question are described in Table 3 below.

Table 3: Problems that teachers face when teaching about natural events and the disasters they cause

Answers	N	f
Because it was being included in the last unit, it was not covered.	68	16
In recent weeks, many students have not been in school or attendance has been lower.	68	13
Students are not interested.	68	11



We had not enough time for this issue. It is covered too quickly and compacted.	68	11
There are no questions about these issues on the general exam (SBS), except plate movements.	68	9
Students are not coming to school after the SBS exam.	68	8

When the findings of Table 3 are analyzed, it can be seen that the major problems arise from leaving the subject until the last unit ($f=16$) and the fact that there are no students at school in the last few weeks ($f=13$). Several of the teachers' opinions about this issue are described below.

T1: *"We struggle when it comes to the last few subjects. For me, it was a real struggle this year. The national examination was held before two weeks the end of school. We have to teach really fast. Normally, We have needed a month for topic of natural events, but we have to complete them in two or three weeks instead. That is why we can't get much more efficiency."*

T10: *"It is the last unit in the 8th grade. They have exams. That makes them disconnect themselves from the lessons. They do not really focus on listening, on the current subject. Subject does not matter; they will treat them all the same. The last unit and the last month do not make a great impact on the students. The lessons are so superficial; we just talk and chat."*

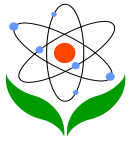
T12: *"We have explained shortly about natural occurrence and disaster. But students didn't watch any CD in lessons. I talked only by drawing on the blackboard. Sometimes, I gave directly knowledge about questions. We did not enough talk about volcanoes, winds, or hurricane. That is a loss. "*

T14: *"First of all, our major problem is that the last units appear at the end of the term and students leave school and prepare themselves for the examination and we cannot teach the last units."*

4. What methods do you use to overcome such problems? Findings related to teachers' answers to this question are summarized in Table 4.

Table 4: Teachers' techniques for overcoming the obstacles related to teaching about natural events and disasters

Answers	N	F
Lectured	35	12
Had students watch animation/video/ CD/DVD documentation	35	8



complete exercises in the book	35	5
Created a discussion atmosphere	35	4
Gave examples from daily life	35	2
Gave homework	35	2
Distributed lecture notes	35	2

When the findings of Table 4 are analyzed, it is clear that one of the teachers' most common techniques is Perhaps traditional lecturing ($f=12$) and the other common one involves visual techniques ($f=8$). The following are several teachers' opinions on the matter:

T1: *"There are slides that we prepare. We try to lead the subjects with them, or we try to launch documentaries related to them. There is no experimental phase here. There are some experimental exercises in which modeling clays can be used, but we are already out of time and cannot do these kinds of exercises. There are not even enough students. The classroom population decreases by 50%. I do these exercises in a way that the students are not going to be bored. Sometimes they prepare dialogues from the books. It is not really effective to explain the information literally and then move on. Students do not focus then. They participate when they have memories or personal recollections. They start to debate, and that is more effective."*

T10: *"There are workbooks that are used randomly. We do the exercises and solve the problems. For instance, we discuss lightning, and then we discuss how we can protect ourselves. They misunderstand and can not distinguish the difference between the lightning itself and what happens when it strikes. I explain the difference and forms of protection."*

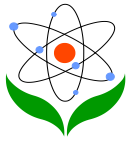
T3: *"Rather than talking, I try to make it more entertaining using pictures and the things I try to express. I use attractive colors and caricatures. In this unit, I usually use projection."*

T9: *"I got the Encyclopedia Britannica CDs. I can launch the volcano videos from there."*

5. "What do you suggest to make topics about natural events and disaster more effective?" Findings from teachers' responses to this question are summarized in Table 5.

Table 5: Teachers' suggestions to make the topics more effective

Answers	N	f
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Disaster education must be related to some practice (simulation center, visualizing, disaster drill, visiting earthquake monuments or museums)	82	43
The topic can be introduced earlier in the semester/year	82	19
Allocated time for this topic can be increased	82	14
SBS can be given after the schools closed	82	4
Teacher should be more informed about the topic	82	2

When the findings are analyzed, it is clear that most of the teachers' suggestions involve performing some practices (simulation center, visualizing, disaster drill, visiting earthquake monuments or museums). (f=43) and with respect to change of place of the unit about this topic (f=19). Several of the teachers' opinions are as follows:

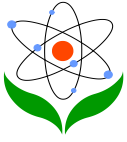
T11: *"If there is adequate time, and if the earthquake drill will be at the same time students can be taken to the earthquake simulation center. I wish I had the time to teach them erosion by conducting a normal experiment, but unfortunately I did not. We can be given much more time. I think this unit about natural events should be taken in the middle of the term. It must follow a spiral; it should be phased into 6th, 7th, and 8th grades. It should be placed into each grade, but not in the last unit."*

T17: *"Sometimes drills are done in the schools, and School staff also let the students know it. But in the years immediately after the earthquake, more often than. For example, in schools was done it three or four times in a year, but now just one time. I mean, if it is done more often, can be more reasonable."*

T11: *"Natural occurrence and disaster are more verbal, more oral, more updated, and more comprehensible. In this reason, they are placed last subject in curriculum. Indeed, for students it is easier to learn and apply than the other topics these topics in their daily lives. If these topics are taken to the beginning of the book, It would be provided more long-term learning and opportunities to practice."*

T6: *"These units are actually soft topics. Since they are not heavy for the students, they can be more effective if they are the first subjects discussed. And, for example, in 8th grade we always say that our first topic is divisions, such as mitosis. It is really hard, both for a student back from the semester holiday and for a teacher. The discussion process begins with the easiest and ends with the hardest, even with the questioning part, so it can be easier and more entertaining to take these units to the top. It can be more effective."*

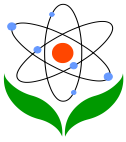
T7: *"The first unit in 8th grade is the topic of meiosis and mitosis. Students can*



be a little bit scared when you start with a difficult topic all of a sudden at first. If the first unit started with natural events, students could increase their interest in science. Meiosis and mitosis can be a little hard for them. Natural events can be placed in the first unit. Or the topic of natural events can be applied with one or two hours of practice, not as a separate lesson, but at the end of the lessons; this is more reasonable."

Conclusions and Discussion

According to the research findings from this study on the Primary Science and Technology Program, teachers in the working group knew that natural events topics were important and needed to be a part of the school curriculum. This is similar to the findings of Buluş-Kırıkkaya, Oğuz-Ünver and Çakın (2011): "Teachers were seeing important of the learning outcomes associated with disaster training in the science program." Half of the teachers interviewed for the present study think that natural events and the disasters they cause should really be taught in the Primary Science and Technology Program. They reported that, unfortunately, these are not really being included in the curriculum. It can be said that teachers have gained awareness of the subject's importance since natural disasters have recently been given a significant amount of attention in the media. The other half of the teachers interviewed in this study expressed that natural disasters are adequately included in the Primary Science and Technology Program's curriculum. Because there are some who think these subjects do not need to be included in the program, those teachers may feel burdened by having to prepare for the subject, designing practices, and encountering obstacles with implementation. Buluş-Kırıkkaya, Oğuz-Ünver, and Çakın (2011) determined that one of the biggest obstacles teachers face is the lack of adequate workbooks about disaster training. They also mentioned to importance of having disaster training sources and materials for resolving teachers' shortcomings of teachers. Safe living and natural disaster prevention interdisciplinary learning outcomes, which are stated in the Primary Science and Technology Program, are only considered by half of the teachers. According to the results of this study, that half of the teachers are defending that learning outcomes, units, and applied activities teaching students about nature events and their risks would be more useful if applied in all grade levels. According to Macauley (2007), trainings for disaster and civil defense are not only included in the official programs, but they are also required to be taken to the educational programs rather than just talked among the teachers. Cardona's (2007) "Disaster Prevention in

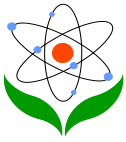


Columbia and Curriculum Adaptation" study stressed that are required to give permission to learning different levels exercises in for nursery, primary, and high school education about experiences on risk reduction and disaster preparation. In this study, a suitable program was created for all grades. It was described to need to be known for each level class. The role of education in post-earthquake situations has been understood, and the program has been successful. The other half of the participant teachers expressed having negative opinions regarding the inclusion of these topics in the science and technology lessons, as they either do not have any ideas especially of interdisciplinary learning outcomes or they think that these subjects are more relevant for social science. On the other hand, Chang (2005), adopting an earth sciences education approach and in a critical analysis of the science program, underlined that these topics should be a part of the Taiwan science program as well as in earth sciences education.

Teachers also expressed that they have had some difficulties with the "Natural Processes Unit." These are mostly related topics with 8th grade and the unit is only placed at the end of the year. Because of this, there is no time to discuss these topics adequately. Most of the 8th grade students who are being prepared for SBS exam do not come to school during the last month of the year. Students do not pay adequate attention to these subjects because they are not covered in the SBS.

Furthermore, it was determined from this finding that some teachers were unaware that there had been questions on natural events and disasters in the SBS exam for the last two years. This situation can be perceived as illustrating teachers' carelessness and it can be explained by students' indifference as well. This finding is supported by Buluş-Kırıkkaya, Oğuz-Ünver, and Çakın's (2011) study. The authors determined that they can be not enough perform disaster education. When this topics can be taught to students, at the same time they have to be prepared related to done national examinations by the Ministry of National Education.

Teachers also noted that they prefer interactive and visual methods of teaching to realize the learning outcomes related to disasters caused by natural events. They reported that doing the workbook exercises with students and facilitating discussions increased student participation. In addition, they reported showing relevant videos. This finding is similar to another finding in Taş's (2003) study. In this study, the author reported that teachers preferred a narration method and mainly used the blackboard and maps for topics related to natural events. Teachers made a number of recommendations for ways to make it more effective and



comprehensible to teach about natural disasters in the Primary Science and Technology Program. One such recommendation was that topics about natural events and disaster can be included in the first unit. Another recommendation was to include the topics in 6th, 7th, and 8th grades. Also, exercise should be done more often, be simpler, and associated with daily life; the allocated time for these topics needs to be increased; an application related to disaster training should be implemented; simulation centers should be constructed; and the placement exam should be given after the school's closure. That finding is similar to another one stated by Taş (2003), who pointed out that, "Both the teachers and the students want a unit to take part in the program since Turkey is originated on a disaster belt which can inform them about foreseen disasters in Turkey." The importance of earthquake exercises was supported by Ocal (2007), who conducted a study on teacher candidates.

According to Dodson (2007), implementations can have a long-term impact on minimizing the devastating effects caused by natural disasters. In addition, Biles and Cobos (2007) think that analyzing disaster zones and roughly drawing or taking photos of the zones can be a good start and can provide fundamental knowledge.

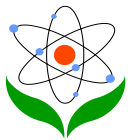
Suggestions

According to the outcomes of the study, the following can be recommended:

- Additional research should be done to explore the reasons why teachers do not want the subjects of natural events and disasters to be added into the Science and Technology Program.
- In order to provide consideration for interdisciplinary learning outcomes in particular, these subjects should be added into teacher training programs.
- Easily accessible and useful visual materials should be provided to the relevant teachers.

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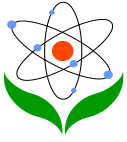
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