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STUDENTS' ASSOCIATION LEVELS OF LIGHT KNOWLEDGE ACQUIRED IN SCIENCE AND TECHNOLOGY COURSES WITH DAILY LIFE

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Abstract
Changing syllabus gives a great importance to the association of acquired knowledge with everyday life. Students come to the secondary level of education; they are expected to explain some everyday life events about light. This study was conducted to reveal the level of fulfillment of this expectation. 8th grade (N=100) students who study at different schools in the province of Trabzon, participated in this research. Students were asked to write scientific explanations of the 18 sample everyday life events which can be explained by using the light knowledge they have acquired until 8th grade. Data obtained from students' answers to the description of each event, were analyzed by coding in the form of true-false-partly true and empty. Light knowledge, most and least associated with everyday life events by students, was determined. It was seen that students' levels of relating the knowledge and everyday life events about light is low, in general. Semi-structured interviews were carried out with 6 students to reveal the reason for this low level. In consequence of this study these can be said; changing syllabus in schools is not adequate in changing practices, teachers do not apply the syllabus completely, and students are preparing for exams, not for life.
Keywords: Light, daily life, teaching science and technology course, association.

INTRODUCTION

One of the learning approaches recently adopted is constructivism. According to constructivism, for an effective science instruction, students should participate into courses actively and use the knowledge acquired through the courses (Kaçan, 2008). For their active participation into courses, firstly students' interest should be focused on the topic, because students' interest is important for successful instruction (Dawson, 2000). Everyone wants to acquire the knowledge in his/her own interest. Though, everyone's interests are different. The foundations under the natural and technological events faced by everyone in this world are the subjects which make them being curious about.

Science and technology syllabuses (6.; 7.; 8.), emphasize using acquired knowledge in solving problems and explaining the events faced in their life by the students. Teachers are expected to use student centered instruction methods and techniques in their courses. Therefore, students are

expected to be scientifically literate at the basic level, when they pass to secondary school. In other words, science and technology course aims to provide students understanding natural and technological events in the world, explaining these events through the knowledge acquired at the courses. Because main purpose of science education is making sense everyday life events by using acquired knowledge. The following question comes to students' minds in courses, 'Where do I need what I have learned from this course?' can be answered through associating the issues with everyday life. This association provides an effective and a long-term learning, influence students' scientific attitudes positively, increase the interest towards the science course (Erduran &Yağbasan, 2004; Enginar, Saka & Sesli, 2002; Yiğit, Devecioğlu & Ayvacı, 2002; Coştu, Ünal & Ayas, 2007; Kara, Kanlı &Yağbasan, 2003).

Most of science issues are known as related to everyday life. But associating the knowledge acquired at schools with everyday life events is not easy as supposed (Cajas, 1999). Researches show that students are not very successful at relating the school science with everyday life events (Yiğit, Devecioğlu & Ayvacı, 2002; Yılmaz, 2008; Taşdemir & Demirbaş, 2010; Ayvacı & Devecioğlu, 2008; Doğan, Kırvak &Baran, 2004; Erduran & Yağbasan, 2004; Enginar,Saka & Sesli, 2002; Coştu,Ünal&Ayas, 2007). According to literature, students are taught abstract knowledge, they do not learn how to use this knowledge and they do not have an interest for the courses with the current applications. (Güneş& Şener Dilek, 2009).

Most of the studies on the students' knowledge association with everyday life events have been focused on a unit or whole course rather than just a particular issue, such as 'light' issue (Yiğit, Devecioğlu & Ayvacı, 2002; Yılmaz, 2008; Taşdemir & Demirbaş, 2010; Ayvacı & Devecioğlu, 2008; Doğan, Kırvak &Baran, 2004). These studies present general information about students' association levels. Studies number researched the association levels of more specific topics with daily life is limited (Özkaynak, 2008; Erduran & Yağbasan, 2004).

One of the physics topics which has a close relationship with the everyday life taught throughout the primary education is 'light'. In this study, it is aimed to determine the 8th grade students' explanation level regarding everyday life events about issue of the 'light' in a scientific way.

METHOD

Case study methodology which is suitable for small samples and limited circumstances was used in this study. 18 everyday life sample events, appropriate for 8th grade level-regarding to the light issue, were determined from various sources. Events are not only about 8th grade 'light' issue, they include all the light issues which they were taught until 8th grade. Students were asked to write the scientific explanation of determined events, explanation of an everyday life event was made by the researchers as an example.

8th grade (N=100) students who are educated at different schools in the province of Trabzon participated in the research. The students' answers to the explanation of each presented event were coded by the researchers, and then these first codes were classified as true, partially true, false and empty.

- Explanations included all the scientific ideas, were accepted as **true.**
- Explanations included some scientific ideas but not totally true, were accepted as **partly true.**
- Explanations, which were irrelevant or not scientific, were accepted as **false.**
- Situations which had no explanations were accepted as **empty.**

After coding had finished, codes were discussed with two science and technology teachers about how to classify the codes. Frequencies of the explanation to each class revealed the students' explanation levels of the everyday life events by using light knowledge, events the most and the least explained. Semi-structured interviews were done with 6 students, about the process of current instruction of science and technology courses and association with everyday life events. The data obtained from the interviews were texted and analyzed.

FINDINGS

Students were asked to explain the everyday life events with 'light' knowledge in a scientific manner and the number of students responding to the each event is presented as true, partially true, false and empty in the table below. Because the total number of students was 100, frequencies were not rewritten.

Table 1. Everyday events about 'Light' and numbers of students' explanations for each event

Events asked students to explain	T	PT	F	E
Using concave mirror through the examination by dentists	1	60	12	27
Showing a wider area from side mirrors of cars	14	-	61	25
Periscope helps to see the surface of the water from under the sea	2	22	37	39
The difficulty of catching fish, although they appear close	32	-	35	33
Despite soap is colorful its lather is white	2	9	49	40
Seeing yourself on backwater in a windless day	48	10	10	32
Occurring rainbow when sun rise after rain	24	17	24	35
Mirage event on the deserts	31	-	44	25
Selection of wooden bench instead of metal bench to sit on, in a sunny day	5	25	38	32
Making the boards located at the edges of highway from phosphorescent material	2	1	67	30
Visibility of the moon in the sky although it isn't a light source	28	14	24	34
Sea is deep, despite appearing to be shallow	34	-	27	39
The colour of sky is blue	11	4	49	36
Displaying the internal organs with the help of fiber-optic cables	14	-	42	44
Burning the paper with the help of glass bottles	23	1	47	29
The colour of sky is more red while the sun is rising or setting	6	20	33	41
Firstly seeing the light of thunderbolt, and then hearing the sound of thunder	54	2	13	31

(T: True, PT: Partly True, F: False, E: Empty)

As shown in the table, number of students who explain the events correctly is very low.
Generally students wrote the benefits of given event to daily life, not the scientific foundation of this event. For example, 50 students explained the 'Showing a wider area from side mirrors on car' item, as to see better, to prevent accidents, to see back area. Some of students' statements, for this event' explanation, are these: *to ensure the driver seeing better by showing a wider area; prevents accidents; showing more details.*

Some of students' statements used at explaining events are displayed in table 2.

Table 2. Examples of students' statements for explained most truly everyday life events

Events asked students to explain	Examples of students' true explanations
Firstly seeing the light of thunderbolt, then hearing the sound of thunder	*By the reflection of light on water* *Reflection of the light by water*
Seeing yourself on backwater in a windless day	*We see by the reflection of light on water* *the reflection of light*
Sea is deep, despite appearing to be shallow	*Refraction feature of light* *Refracting the sun's rays by the liquid*

Some of students' statements for most falsely explained events are displayed in table 3.

Table 3. Examples of students' statements for most falsely explained everyday life events

Events asked students to explain	Examples of students' false explanations
Making the boards located at the edges of highway of phosphorescent material	*Because the cars can see boards better in the dark* *Preventing the accidents by reflection at night*
Showing a wider area from side mirrors on car	*Being of concave mirror* *To see the cars closer*
Lather is white, despite its soap is colorful	*Refraction of light* *Soap has colorant*

Data from interviews with students revealed that students hear most of the events which are located in textbooks. While describing the instruction process, some students stated that teachers emphasize on the exams' placement, instructions of concepts and terms. Some of the students reported association knowledge with everyday life events is making life easier. Some of the students' own words are as follow:

'First, teacher achieves the main concepts of the issue and then asks questions related to this issue' that may be in exams' placement.'

'Learning some of the issues in other courses does not provide much benefit in daily life, but learning some of the physics issues provide a lot of facilities in the daily life.'

'Science and technology course intertwine with daily life; our books usually present examples from daily life or telling us to link the issue with daily life. Many issues can be associated, for example calculating the electricity bill.'

DISCUSSION

It is shown that students are inadequate at explaining everyday life events in a scientific manner. These results are parallel with studies in related literature (Yiğit, Devecioğlu & Ayvacı; 2002, Yılmaz, 2008; Taşdemir & Demirbaş, 2010; Ayvacı & Devecioğlu, 2008; Doğan, Kırvak &Baran, 2004; Erduran&Yağbasan, 2004; Enginar, Saka & Sesli, 2002; Coştu, Ünal & Ayas, 2007).

Yiğit, Devecioğlu, Ayvacı (2002) researched 8th grade students' association level for science concepts and daily life events. They found that the highest level of this association is about the

issue of electrification, with %63.6 (N=250). Similarly up to 61 students (N=100) explained the same event correctly in our study. The event explained correctly by 61 students is 'Firstly seeing the light of thunderbolt, and then hearing the sound of thunder'. The reason of this highly-corrected explanation may be referring the event in light and sound units.

Although 'Making the boards located at the edges of highway from phosphorescent material' and 'Visibility of the moon in the sky although it isn't a light source' events have similar explanation, while 2 students explained correctly the first ones, 28 students explained the second. This shows that students fail transferring their knowledge to a new situation. Students don't research the issue they have learnt at school. They are contented with mentioned examples in courses.

In our study students were given everyday life events, they were asked to explain the event in a scientific manner. In contrast to our study Taşdemir and Demirbaş (2010) wanted students to give examples about 50 concepts which is common between 6th and 7th grade science and technology course. As a result of this study, it was shown that students gave most correct examples about the conceptions of light and sound unit. In consequence of our study, it was shown that students were inadequate at explaining everyday life events about 'Light' issue. Considering the results of two studies together; students may find easier how to give examples for a science concept and have more difficulty at explaining the events in a scientific manner.

One of the reasons of failure at using science knowledge while explaining everyday life events is exams' placement. In Ayvacı and Er Nas (2009) research, 17 of 31 teachers stated that training centers are aiming to develop students' test-solving skills and prepare them for exams. This finding consisted of data from interviews of students in our study. Placement exams direct students to gain the ability of solving multiple choice tests.

CONCLUSION

The syllabus will succeed when students use acquired knowledge for understanding the events they encounter. This study shows that current applications are insufficient in providing this situation. Changing syllabus in schools is not sufficient to change practices; students and teachers give importance to the placement tests that are at the end of each year. Students who are preparing for these exams emphasize only that year's issues; they do not repeat the previous years' issues. In order to avoid this; more effective teaching methods should be used for a long term learning by the students, only that year's issues should not be given in the placement exam. Training centers should provide instruction which is parallel with syllabus and schools (Ayvacı & Er Nas, 2009). Arrangements should be made for teachers to give importance to associations of courses with everyday life; students should use their knowledge on project assignments, they should be directed to researching field and to find examples related with the issues. They can be asked to research the application of learnt issue in our life or technology. As stated by Coştu, Ünal, Ayas (2007), problems encountered in daily life can be presented to students at courses and discussed with guidance of teachers in groups. Workshops can be prepared to inform teachers about the importance of making association between science knowledge and daily life events. Teachers

should be aware of technological developments, because technology can serve as a key function at integrating the scientific knowledge into everyday life (Cajas, 1999).

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