



Pre-Service Science Teachers' Views Towards Socio-Scientific Issues*

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Abstract

Aim of science course is to introduce students themselves, their environment and provide them basic living and thinking skills. In this connection science course encounters students with problems related to their daily life, help them to realize and inquire these problems, provides possibilities for solution of these problems and support them in synchronization with environment. Therefore, general aims of science education curriculums are training self confident, cooperative, decisive students who have problem solving skills, inquiry learning skills, effective communication skills and sustainable development awareness. One of contemporary methods which would promote this ability is socio-scientific argumentation. Students will be able to introduce themselves in better way and participate in courses actively. Therefore, use of socio-scientific argumentation which includes social, economic, moral and scientific dimensions in it's context would be effective.

Controversial nature of socio-scientific issues are related to uncertainty in several topics. Inevitable ethical issues and complexity exist in nature of socio-scientific issues. Therefore ideas of individuals might differ greatly. In this connection its thought that socio-scientific argumentation would improve students' discussion and inquiry skills. One of the main components of Turkish science education program is socio-scientific argumentation. In addition, socio-scientific issues consist in textbooks. Therefore, science teachers should have a strong background about socio-scientific argumentation in order to use it in classroom and guide their students. What is more, considering that teachers train students who have knowledge about socio-scientific issues and aware of risk factors, they should be aware of socio-scientific issues themselves and graduate from teacher training institutes with proper background. In these terms, pre-service science teachers' awareness about socio-scientific issues gain importance. Therefore, aim of this study is to examine pre-service science teachers' views towards socio-scientific issues.

Survey method used in this research. Qualitative data will be gathered with semi-structured interview. Semi-structured interviews will be done with pre-service science teachers about socio-scientific issues. After interview, gathered data will be analyzed with content analysis.

1. INTRODUCTION

Argumentation based learning method is a written/oral activity in which students inquire their own models and colleagues' models, use backings, warrants and evidences suited to scientists thinking systems in order to defend their own models, use rebuttals to reveal their colleagues' model faults. Therefore, in this learning method, defending current model and using rebuttals to remove flawed leads to conceptual change (Gültepe, 2011). Argumentation, which is emphasized by science educators intensively, is not a simple discussion, contention and claim assertion. Argumentation can be seen as process in which claims are supported by data and valitade by warrants (Toulmin, 1958). Toulmin, who revealed that argumentation is both part of a daily life and an unremovable piece of reasoning process, presented a model that defines components of argumentation and indicates relationships between these components.

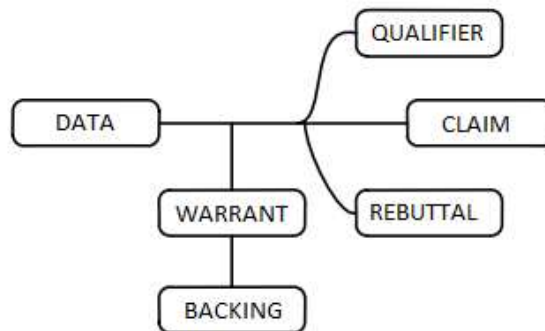


Figure 1: Toulmin's argumentation model

According to this model, main components of an argument are claim, data and warrant; more complex arguments also include backing, qualifier and rebuttal.

We can say that socio-scientific issues have a great importance in education field. Opening socio-scientific issues to argumentation in classrooms and combining decision socio-scientific decision making process with learning is an important educative aim (Soysal, 2012). Education given in classroom should reflect basic relationship between science and society. In this process modern issues which might be encountered by all societies and solved by science should not be handled alone. Social, politic, economic and moral dimensions of these issues should be considered and this situation forms framework of socio-scientific issues (Sadler & Fowler, 2006). Sadler and Zeidler (2005) defined socio-scientific issues' properties as indicated below:

- Socio-scientific issues have a scientific background and includes discussion and contrast.
- Socio-scientific issues usually discussed under politic and social variables.

Argumentative nature of socio-scientific issues are related with uncertainty level in several topics (Simonneaux, 2008). Nature of socio-scientific issues includes complexity and unavoidable ethical issues. To indicate simply, socio-scientific issues are value loaded and may be disturbing for scientists, teachers and students by view of science and ethic (Hughes, 2000). Thus, in socio-scientific issues there are opinions rather than truths accepted by everyone. Alaçam Akşit (2011) indicated that prospective science teachers see themselves inefficient by required knowledge method and techniques when teaching with socio-scientific issues, see their bachelor degree not enough efficient in terms of learning. In study by Rannikmae (2002) it's indicated that teachers have inadequate knowledge about socio-scientific issues and find difficult to provide socio-scientific decision making process skills and problem solving skills to students. These studies indicates that not only students but also teachers see themselves inefficient about socio-scientific issues. Thus, we can say that education studies about socio-scientific issues are very important. According to these, aim of this study is to determine prospective science teachers' views towards socio-scientific argumentation method.

1.1 Research question

"How are views of prospective science teachers towards using socio-scientific argumentation?"

2. METHOD

This study is a descriptive study. Semi-structured interview from qualitative research techniques used in order to determine students' views towards socio-scientific argumentation method. In semi-structured interview, part of interview consist of structured questions while other part consists of unstructured questions which allows individual to give free reaction (Erkuş, 2005). In this study, semi structured interviews made with prospective science teachers and their views about using socio-scientific argumentation method in science education are examined.



2.1 Study group

Study group of this study consists of fourth grade prospective science teachers (n=6) studying science education at an university in city of İzmir. Open ended semi-structure interview questions asked to prospective science teachers in order to determine their views towards socio-scientific argumentation method. Semi-structured interview questions were prepared by researchers. Participant prospective science teachers were selected voluntarily.

2.2 Data collection tools

Five semi-structured interview questions were developed in order to determine prospective science teachers' views towards socio-scientific argumentation method. In process of semi-structured interview questions development, three experts were asked for their views. After corrections and additions proposed by experts are completed, semi-structured interview questions were given their last shape.

2.3 Data analysis

Descriptive analysis from qualitative analysis techniques was used to analyse semi-structured interviews.

3. FINDINGS

In order to answer research question "How are views of prospective science teachers towards using socio-scientific argumentation?" views of participant prospective science teachers were examined.

In question "Have you heard argumentation and socio-scientific argumentation methods before? What do you know about these methods?" prospective science teachers indicated that they can define and share their views about argumentation and socio-scientific issues but have difficulties when defining socio-scientific argumentation method. About this topic prospective teacher A indicated this: "Socio-scientific issues are up to date and scientific issues, issues that folk speak about. We can have nuclear reactors as an example. I guess in argumentation there was evidence method, we were using rebuttals. There were methods to prove a topic in argumentation as far as I remember".

In question "How is a socio-scientific argumentation based classroom environment in your opinion?" prospective science teachers indicated that a classroom environment in which students can express themselves comfortably and have discussion required in socio-scientific argumentation, and physically students should be able to see each other clearly. Prospective teacher D indicated this "Students should be able to express themselves, teacher has to encourage them to be self confident."

In question "How are students' roles socio-scientific argumentation based classroom environment in your opinion?" prospective science teachers indicated that students should express their views independently and clearly, but also respect their colleagues' views when they share. Prospective science teacher D indicated this: "Roles of students are to indicate their views and respect their colleagues' views, they should respect when listening to their colleagues' views." Prospective teacher B: "Should be interested in learning science, shouldn't have any prejudice against colleagues' views, should produce ideas." Prospective science teacher C: "Should be a good listener."

In question "How are teachers' roles socio-scientific argumentation based classroom environment in your opinion?" prospective science teachers indicated that teachers should guide their students and draw their attention and interests. Prospective science teacher A indicated this: "Teacher should has attention of students, ask questions to them and assign them in-class duties." Similarly, prospective science teacher C indicated this: "Teaches should provide students equality of views, redirect students and guide them during argumentation."

In question "How is assessment in socio-scientific argumentation based classroom environment in your opinion?" prospective science teachers indicated that assessment methods used at the end of semester will be ineffective in this learning method and process learning should be used instead. Prospective science teacher A indicated this: "It may be hard to assess in this method, because there is not a single truth. Test or written end year exam can not be used. Process assessment would be better."

4. CONCLUSION

Research question of this study indicated as "How are views of prospective science teachers towards using socio-scientific argumentation?".



During interview, prospective science teachers views towards argumentation and socio-scientific argumentation were taken. Prospective science teachers indicated that they can define and share their views about argumentation and socio-scientific issues but have difficulties when defining socio-scientific argumentation method. Parallel to this finding, Alaçam Akşit (2011) indicated that prospective science teachers see themselves inefficient by required knowledge method and techniques when teaching with socio-scientific issues, see their bachelor degree not enough efficient in terms of learning socio-scientific issues, In addition,

During interview, prospective science teachers views towards classroom environment based on socio-scientific argumentation were taken. Prospective science teachers indicated that a classroom environment in which students can express themselves comfortably and have discussion required in socio-scientific argumentation, and physically students should be able to see each other clearly. Similarly, Özer (2009) indicated that in argumentation process there should be a classroom environment in which students can express their views clearly in order to encourage them to think. In addition Soysal (2012) indicated that classroom environment should be designed to ensure every student to see each other clearly.

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During interview, prospective science teachers views towards teacher role in classroom environment based on socio-scientific argumentation were taken. Prospective science teachers indicated that teachers should guide their students and draw their attention and interests. Parallel to this, Goloğlu (2009) indicated that teachers should guide their students in socio-scientific argumentation process and help students to reveal their real thoughts. Within these terms, teacher role in socio-scientific argumentation is highly important.

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5. IMPLICATIONS

- Interviews with prospective science teachers revealed that prospective science teachers feel inefficient and incompetent about using socio-scientific argumentation in their future courses. Thus, instructions and practices about socio-scientific argumentation in ecience education bachelor degree should be increased and enriched.
- In this research semi-structured interviews conducted with 4th grade prospective science teachers. Similar interviews might be conducted with teachers and students who experienced socio-scientific argumentation.

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