



Examining the Data Component Used by Seventh Grade Students in Arguments Related to Local Socioscientific Issues *

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Abstract

The purpose of this study is to examine the quantity and quality of the data component used by seventh-grade students in their arguments related to issues unique to the city of Bolu: Seben Lake, chicken coops, leather tanneries, base stations, and Hydroelectric Power Plants (HPP). Three different study groups, with 12 participants in each group (in total 36 participants), were the subject of this research, which was conducted over a total of 10 weeks. Each study group interacted with a different data source: the outdoor group collected data on field trips, the newspaper group read and examined related articles in the press, and the presentation group listened to visual presentations. The groups reflected the data obtained from their data sources to the argumentation implementations. The resulting of content analyses, based on the items in Toulmin's (1958) argument model showed that, of the total of 847 data components generated in the participants' argumentations, the newspaper group used the most data in their arguments, while the presentation group employed the least data. The outdoor and presentation groups generally utilized data based on the data cited in their data source, while the newspaper group used more data based on their daily life experiences. The highest amount of data was employed in relation to the issue of leather tanneries based on data acquired during field trips in the outdoor group, in relation to HPP based on visual presentations in the presentation group, and in relation to Seben Lake based on daily life experiences in the newspaper group. In conclusion, the quantity and the quality of the data component used in students' arguments with regard to local socioscientific issues changed according to the data source with which they interacted and the content of the socioscientific issue. In light of this, a few suggestions are made in this paper's conclusion.

Keywords

Local socioscientific issues
Argument
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Introduction

Numerous scientific and technological developments in the twenty-first century have focused our attention on certain controversial issues. Faced with such controversial situations, the capacity to evaluate alternative situations and to confront evidence-based decision making processes (Evagorou, 2011) is important; not only for adults but also for younger students in order to ensure healthy decisions are made in the future. Driver, Newton, and Osborne (2000) emphasize that one of the central components of science education, which will help students make decisions now and in the future, is the argumentation process.

The concept of argumentation can be described as the form of speech that emerges through the evaluation of these claims in the light of the theoretical or empirical evidence to form individual or collaborative claims (Erduran & Jiménez-Aleixandre, 2007). Argumentation is viewed by many science educators as an important skill because it allows for meaningful learning through participation in cognitive and metacognitive processes (Jiménez-Aleixandre & Erduran, 2007), thus enabling students to freely express knowledge learned at school with regard to controversial topics. Toulmin's (1958) argument model is frequently used for analyzing students' argumentation practices (Demircioğlu & Uçar, 2014; Erduran, Simon, & Osborne, 2004; Venville & Dawson, 2010; Zohar & Nemet, 2002). This model defines an argument structure that consists of various components: claim, data, warrant, backing, qualifier, and rebuttal. According to Toulmin (1958), the claim is the result based on the fact; data, facts proposed to support the claim; warrants, statements or reasons providing the link between claim and data; backing, assumptions supporting and confirming the warrant with certain bases; limitations, conditions that the claim can be accepted as correct, and statements indicating the limits of the claim; rebuttal is an indication of situations in which the claim will not be right. Toulmin (1958) states that it is not necessary to employ all of these components in an argument; however, the claim, data, warrants, and backing components are the basic components that must be addressed in any argument.

On the one hand, certain researchers (Acar, Turkmen, & Roychoudhury, 2010; Cavagnetto, 2010; Evagorou & Osborne, 2013; Sadler, 2004) state that socioscientific issues are appropriate to the context for analyzing argumentation processes because they constitute a controversial environment and allow students to argue from multiple perspectives. On the other hand, some researchers (Callahan, Muller, & Schiller, 2008; Dawson & Venville, 2009) suggest that argumentation skills must be integrated into the science curriculum. Using socioscientific issues as the subject of debate implies the following three points: firstly, though said topics are social, they also contain scientific factors; secondly, science and society can not be separated from each other; and finally, science and society are complex, open-ended, dilemmatic, and not specific (Sadler, 2004). Such topics can be local (Evagorou, Jiménez-Aleixandre, & Osborne, 2012; Kolsto, 2006) or global, such as developments in biotechnology (Kutluca, 2012; Sadler & Zeidler, 2004, 2005; Zohar & Nemet, 2002) or environmental issues (Kortland, 1996; Yang & Anderson, 2003).

Zeidler, Sadler, Applebaum, and Callahan (2009) argue that students are thus exposed to moral problems through scientific, social, and ethical perspectives, indicating that they use data manipulation and interpretation skills in relation to socioscientific issues. Students encountering such problems in a controversial setting are expected to support their arguments or choices with evidence and to demonstrate certain characteristics, such as evidence-based knowledge, which distinguish a good argument from a weak argument (Jiménez-Aleixandre, 2007). At this point, it becomes clear that the use of the data or evidence is fundamental. Indeed, Maloney and Simon (2006) argue that it is important for children to know how to participate in the process of scientific debate and to learn how to use evidence in these debates, as well as in future decisions related to socioscientific issues.

The controversial nature of socioscientific issues allows arguments related to these issues to be constructed from multiple perspectives (Sadler, 2004). Incorporating many unique perspectives leads individuals to examine such issues in different ways and thus to produce different solutions (Sadler & Zeidler, 2005). It is also reported, however, that there is no definite solution to such issues and that there is no obligation to consider a scientific perspective, though it is possible to base multiple scientific solutions on scientific principles, theories and data (Sadler, 2011). Unlike scientific argumentation, in socioscientific argumentation students can use evidence based on such factors as social, economic, ethical, moral, and religious angles (Braund, Lubben, Scholtz, Sadeck, & Hodges, 2007; Sadler, 2011; Sadler, Barab, & Scott, 2007; Sadler & Fowler, 2006; Zeidler, Walker, Ackett, & Simmons, 2002), rather than on scientific information alone (Albe, 2008; Sadler & Donnelly, 2006; Tytler, Duggan, & Gott, 2001). Tytler et al. (2001) also note that informal evidence based on common sense, contextual evidence, and personal experience can be used in this process. In short, it can be said that, unlike the evidence used in reference to scientific topics, the evidence used in relation to socioscientific issues is more uncertain (Acar et al., 2010). What is meant by the expression of ambiguity is not the uncertainty of evidence; it infers the difficulty of predicting what kind of data will be used in the socioscientific argumentation process other than the scientific data.

If the data component used in the socioscientific argumentation process and the resulting evidence is unclear, this may be a result of the large number of data types that can be employed in the construction of such an argument. Jiménez-Aleixandre (2002), who echoes the points raised by previous researchers, concluded that students' decisions on the environmental management of wetlands were based not only on conceptual understanding or scientific evidence but also on value-based evidence. According to the researcher, participating in the problem-solving process in real-life environments facilitates students' ability to combine conceptual understanding with their values. Similarly, Tal, Kali, Magid, and Madhok (2011) found that students participating in field trips were able to make stronger and more relevant judgments when deciding whether or not to volunteer to participate in a fundraising program on cystic fibrosis. Evidently, the diversity and integration of data components used to support and elaborate students' arguments are affected by the data sources to which they are exposed.

Research into existing literature on the use of data and evidence in the decision-making and argumentation process has led to the discovery of certain difficulties students may encounter. Such researchers have shown that students are unable to find evidence to support their claims (Cho & Jonassen, 2002; Ratcliffe, 1997; Sandoval & Millwood, 2005), that they do not associate evidence with their claims (Acar et al., 2010; Fleming, 1986; Sadler, 2004; Watson, Swain, & McRobbie, 2004; Zimmerman, 2000), and that they continue to advocate their original claims (Evagorou et al., 2012), thus contradicting evidence. In terms of contributing to existing literature in the field of science education, it could be worthwhile to develop awareness of the difficulties encountered by students in the process of argumentation and to take a closer look at the data component of arguments.

When examining studies in the national literature, it can be seen that there are very few researchers related to argumentation used with regard to local socioscientific issues and that these are limited to accessible resources (Demircioğlu & Uçar, 2014; Eş, Mercan, & Ayas, 2016; İşeri, 2012; Öztürk, 2012). Considering the need for real-world problems to be placed at the center of the science program (Evagorou, 2015), there is thus a greater need for research into socioscientific issues related to the society in question. The present research, which has been conducted in line with this need, aims primarily to inspire wider participation in decision-making processes related the real problems facing Bolu city, where the participants live, and for them to be involved in the process of argumentation. As second, even though the local socioscientific issues are handled within the scope of Bolu city, it is thought that similar problems may be encountered in other cities or even other countries and it is also thought that

these problems will be revealed and similar researches will be carried out in that cities or countries. Furthermore, it is thought that this study will also contribute to existing literature in terms of providing information on local socioscientific issues and suggesting how to use the data sources presented to the participants.

It should also be noted that research into socioscientific issues is mostly conducted with high school students, university students, and prospective teachers; few studies have involved younger children (Evagorou et al., 2012; Topçu, Muğaloğlu, & Güven, 2014). In this context, this research makes another contribution to the literature in that it was carried out by seventh grade students at secondary school. Indeed, science education researchers and teachers have shown an interest in studies exploring younger students' interaction with socioscientific issues.

Based on these aims, this research seeks to determine the both of quality and quantity of the data component employed by seventh grade students in their arguments related to five different local socioscientific issues. In order to achieve this, we first determined the frequencies of the data components used in participants' arguments, based on their knowledge of local socioscientific issues, as acquired from three different data sources. The next stage involved comparing the data used by the participants in their arguments across the three study groups. This was done by determining the socioscientific issues most frequently used in the form of cross-sections from the data source to which they were exposed or from the data encountered in their daily lives. It is thus thought that the three different data sources considered in the research will provide an important insight in terms of the application of arguments in the quantitative and qualitative analysis of data components in participants' argumentation. At this point, it may be useful to consider the data component, the subject of this research, in light of the aforementioned fact that the data component discussed in the socioscientific context may differ from that of scientific arguments. The research questions guided the research are given below:

1. How is the quality of data component that seventh-grade students use in their arguments in five different local socioscientific issues?
2. How is the quantity of data component that seventh-grade students use in their arguments in five different local socioscientific issues?

Method

This research, which is suited to the nature of qualitative research, used holistic multiple case design. According to this design, there is more than one case that can be perceived as a whole in its own right: that is to say, each case is handled holistically and then the process and result between the cases are revealed by comparing them with each other (Merriam, 1998; Yıldırım & Şimşek, 2006). In this study, the argumentation processes of three different groups learning about the same socioscientific issues from different data sources were first subjected to separate holistic evaluations, then being compared across the three groups.

Participants

The research involved three study groups: an outdoor group, a newspaper group, and a presentation group. There were 12 participants in each group, and so 36 participants in total. These groups were limited to middle school students in seventh grade who continued the spring term of 2012–2013 years at three different state schools located in Bolu city center. Convenience sampling and criterion sampling methods were used in the selection of participants for purposeful sampling methods (Patton, 2002). With convenience sampling, schools were located in close proximity to each other in the city center, where they would not have trouble accessing researchers. With criterion sampling, students were chosen based on their level of academic achievement and their socio-economic background according to the information received from the Provincial Directorate of National Education. The reason for selecting middle level students in terms of achievement and socioeconomic level is to work with similar level students in terms of these criteria. In other words it was thought that it would be difficult

to work with the extreme groups and that the contribution of the extreme groups to the research could not meet the researchers' expectations. Besides, volunteering to participate in the research is another criterion used in student selection, as participants are asked to devote time outside the school hours to the research.

The distribution of students to the study groups was carried out in two stages. First, the study group assigned to each of the three schools was randomly determined. Thus, students from three different study groups are in three different schools, so it was tried to avoid that being aware of what each other is doing and interaction with each other. In the second phase, 12 volunteer students who wanted to participate in the research were selected from each school. After obtaining the necessary permits from the school administration in each school for the selection of these students, the views and assistance of the teachers of science and technology course were applied. It was expected from the teachers that they would suggest the students who had middle achievement level and would provide important contribution to this research. By means of the teachers, it was determined that each school would reach the students and they participated in the research voluntarily. Then, these students were informed about the research and explained what they were expected to do. They were also asked to take the time to investigate outside of school hours and to bring a document showing that their parents gave their signed confirmation that they had no obstacles to participate in the survey.

Since all participants in the study groups were seventh-grade students and were middle level in terms of achievement and socio-economic status, the groups were accepted as equivalent groups in terms of class level, achievement and socio-economic level variables. Although the majority of participants in the study groups were female, the gender distribution of the participants in the groups was not considered because gender was not a variable discussed in the study.

Data Collection Tools

The data gathered consisted of small group and whole class discussions among participants concerning each of the relevant local socioscientific issues. These discussions were turned into data sets by means of argumentation worksheets, as well as audio and visual recordings. Argumentation worksheets were used to direct group discussions and to obtain written argumentation data. Since this article only included verbal arguments, the main purpose of the worksheets was to inform the participants about the relevant socioscientific issue and to direct their discussions. Therefore, in this article, the data on the written arguments obtained from the worksheets are not presented but only the oral argumentation data is presented.

The argumentation worksheets prepared by the first researcher were based on open-ended questions, enabling participants to construct arguments and make decisions using a prepared written text, by examining the positive and negative news in the local press (presented in Appendix-1). The creation of these questions employed the question format used in a study by Zohar and Nemet (2002). The number of questions varies from five to nine depending on the subject matter and sub-questions. Six different expert of which three research assistants, two assistant professors and one professor who have graduate degrees in the field of science education opinions were consulted to obtain construct-and content-related evidence from the argumentation worksheets. An evaluation form has been developed in which 24 criteria are evaluated under language, content, general appearance and question themes so that experts can evaluate worksheets. This form is required by experts to be used separately for each topic. Thus, the worksheets were rearranged in line with their comments, incorporating the experts' suggestions and revisions into the written text and open-ended questions. The expert review strategy used at this stage was a factor that increased the internal validity (credibility) of the research by providing a critical review of the worksheets and providing feedback to the researcher. With the pilot study conducted to determine whether or not the worksheets could be understood, the final format of worksheets was determined by making necessary revisions in light of features such as the balance of question numbers, compatibility, quality, and consistency across the worksheets.

Participants' small group discussions, relating to the written text and the questions in the argumentation worksheets, were recorded using a voice recorder from beginning to end. During the whole class discussion, in which discussions between the small groups took place, the argumentation process was recorded on camera to ensure that every argument expressed by the participants was documented. Thus, all the data generated in the oral argumentation process were gathered using combined electronic means. It is thought that the data obtained from both small group discussions and whole class discussions of students will contribute variety to the research. At this stage, the use of the diversification strategy has been another factor that increases the internal validity (credibility) of research by providing various data sets from different sources. Also, the records are deciphered and the data set obtained is transferred as if the data were collected via audio and video recordings without any changes being made. This process is also thought to contribute to the credibility of the research.

Implementation Process

In practice, five different local socioscientific issues, important in the environmental context of in Bolu province, were discussed by participants. The first three issues are unique to Bolu city, and the last two are issues that can be encountered in other cities as well. However, it is thought that the handling of these two issues only in the Bolu province gives them a local dimension. Two weeks were allocated for each topic, and in total the study lasted ten weeks. Therefore, this research is limited to the five local socioscientific issues and ten-week period of implementation for these issues. Detailed information on each of these issues is provided below:

- *Seben Lake*. During the argumentation process, participants discussed the issue of whether or not the artificial Lake should be opened up to tourism. The man-made Lake spans a considerable area in order to meet the irrigation needs of agricultural areas in the Seben district of Bolu province. This Lake has caused disputes among the public and biologists over the past few years due to the fact that it is seen as being unnatural and unnecessary, as well as increasing the amount of moisture in the city. Nevertheless, certain members of the authorities believe that there are economic benefits to opening the lake up to tourism and that the socialization in and the recognition of the region will increase as a result. Recently, debates have started to consider possible consequences of the Lake project, such as the destruction of nature and inconveniences for local inhabitants.
- *Chicken Coops*. During the argumentation process, participants argued the issue of whether or not the chicken coops in Bolu should be removed from the city. On the one hand, the chickens housed in the many chicken coops in Bolu provide a significant portion of the city's, and indeed the whole country's white meat requirement. In addition, a large number of people are employed in these poultry farms. On the other hand, the waste from the poultry presents a problem, particularly in the summer months, because of the bad smell and the formation of pigeon lice, which disturbs residents living in the vicinity.
- *Leather Tanneries*. During the argumentation process, participants discussed whether or not the leather tanneries should be moved out of the city. Located in Gerede, one of the districts of Bolu, these tanneries transform animal hides into various leather products through the use of chemical materials, contributing greatly to the economy of the city and the country, as well as providing a source of income for many people. A problem has arisen, however, as a result of the waste created by these tanneries: the bad odor and environmental pollution in the district have disturbed the public.

- *Base Stations*. During the argumentation process, participants discussed whether or not the base stations in Bolu city center should be removed from the city. A large number of base stations in Bolu city center are believed by some to cause long-term health problems due to the electromagnetic waves emitted, although they are required for uninterrupted mobile communication. Cancer cases reported in one village in Bolu, combined with the fact that some base stations are camouflaged and set up in various parts of the city, have created controversy among the public and caused debate.
- *Köprübaşı Dam and Hydroelectric Power Plants (HPP)*. During the argumentation process, participants considered whether or not the construction of numerous HPPs, due to be built on the rivers in Bolu, should be continued. The existing power plant, located underground in the Mengen district of Bolu, meets the city's demand for electrical energy and provides job opportunities for people living in the region. The establishment of the power plant, however, has caused rich vegetation, agricultural fields and even some of the villages in the area to be in undated and some villagers were forced to leave their homes.

All three study groups were firstly given argumentation training by the first researcher. In this training, the definition of argument and argumentation, the components in the argument model of Toulmin (1958), the components to be argued, the components of strong arguments and the examples of good and bad arguments are emphasized. In addition, the activity worksheets were distributed and the small group discussion and whole class discussion were made and the argument components in the activity were emphasized clearly. Along with this training given to all study groups, it is ensured that all study groups have knowledge of the argument and argumentation. Following this training, which was identical to each group, different argumentation applications were employed in each group, as shown in Table 1.

Table 1. Argumentation Process in Study Groups

Group	First Week of Each Issue	Second Week of Each Issue
Outdoor	- Argumentation worksheets (pre) - Field trips and interaction with stakeholders	- Small group discussion - Whole class discussion - Argumentation worksheets (post)
Newspaper	- Argumentation worksheets (pre) - Newspaper articles - Small group discussion - Whole class discussion	- Argumentation worksheets (post)
Presentation	- Argumentation worksheets (pre) - Informative presentation - Small group discussion - Whole class discussion	- Argumentation worksheets (post)
In total: 10 weeks (two weeks per issue)		

Argumentation practices were likewise carried out by the first researcher in all study groups and the same subjects in each study group were processed in the same weeks, respectively. All study groups focused on the same issue during each two-week period. The discussions in the outdoor group took place in the second week of each two-week period, since field trips were undertaken in the first week. The process of implementation was given at the below;

- The first week of implementations related to each of the issues begins with each participant in the study groups individually filling in the argumentation worksheets. The argumentation worksheets were completed within 30–40 minutes.

- The participants then interacted with the data source within the relevant socioscientific context by creating small groups of randomly three or four heterogeneous structures. To explain more specifically, the participants in the outdoor group collected information that would support their arguments by interacting with the stakeholders of the issue during the field trips, the participants in the newspaper group reviewing the local newspaper articles, and the participants in the presentation group evaluating the oral and visual presentations made to them. Thus, small groups in each study group interacting with the data source are placed at different points in the class so that they are not affected by noise and opinion exchange during the argumentation process. Participants were asked to transfer the data they gathered to small group discussions during this process.
- In the small group discussions, each group member discussed as much as convincing the other group members with different points of view, such as positive/negative, advantageous/disadvantageous, in the context of the questions on the argumentation worksheet. After an average of 15–25 minutes of discussion, group members agreed on a group decision. After this stage, the whole class discussion was held between the small groups.
- The discussion of the whole class has been applied in the form of a discussion with small groups in each study group and the reason for doing this is against the possibility that in the small group discussions there is no opposing opinion among the group members so that they cannot refute each other's opinions.
- In the second week of the implementations, the argumentation worksheets on the issue of the first week was given again in order to understand whether the individual decisions of the participants have changed.

The difference in implementation was that each of the three groups interacted with their own specific data source; the applications related to the said source, however, were carried out in the same way. In all study groups, the same points were addressed regarding the local socioscientific issues discussed, and attention was paid to equality between the information that the groups learned. The data sources with which the study groups interacted and information about the practices implemented are outlined below.

Outdoor Group: Participants in this group interacted with stakeholders who accompanied them on field trips to the areas with the researcher and those who helped him affected by each local socioscientific issues. Participants' participation in these field trips was preceded by family consent, and the first researcher visited the trip area before the trip and took necessary precautions. Participants were also kept under constant control during the excursion and various security measures were taken, such as having a vehicle and first aid kit against possible problems. Participants made observations and conducted analysis related to each issue and obtained information by asking questions that aroused their curiosity, as explained below:

- When the participants went to Seben Lake, they observed the natural environment and the physical characteristics of both the Lake and its tributaries. Later on, participants met with the public and village leaders in the surrounding areas, who shared their opinions about the benefits and drawbacks of the Lake and whether or not it should be opened up to tourism.
- During the week spent visiting the chicken coops, participants are not allowed to enter to the chicken coops and they made chicken manure observations and obtained information from people interested in the maintenance of chicken coops. The participants then interacted with the authorities and visited the slaughterhouse where the chickens are prepared and made suitable for sale.

- During the week spent visiting leather tanneries, participants walked through the leather tanneries and interviewed leather workers and tannery officials about what kind of system they had inside and what stages they were going through to make the animal cultures usable. Participants who observed leather products obtained by processing raw hide afterwards They visited the Ulusu Stream, where wastewater is treated and where waters formed as a result of the treatment are filtered; here, they made observations and interacted with stakeholders.
- During the week focused on the issue of base stations, an electric-electronic engineer was invited to the classroom to inform participants about the base stations. Following this interaction, participants closely monitored one base station located between neighborhoods and interviewed local residents about this base station.
- The participants taken to the location of the Köprübaşı Dam and HPP in Mengen County observed water bodies in the dam and some houses submerged by water. The participants who visited the plant received information about the plant from officials.

The data gathered by this group came from a range of data sources, including people they met during the trips, the situations or events they encountered, the features of the environment they experienced, or indeed any other aspect related to the stakeholders.

Newspaper Group: Participants in this group were given articles with positive and negative angles on the socioscientific issues covered by the local newspapers in Bolu accessed by the first researcher. Online access was provided, and each member of the group was provided with the opportunity to examine the news. A total of six newspaper articles, three of which offered positive angles and three of which offered negative angles, were given to participants during the week in which they discussed each issue. These articles were written in a clear and understandable manner, reflecting the socioscientific dimension of the topics covered in the study and can also be discussed in the other study groups. Each piece contained a visual and a half-page text, copied directly from the newspaper without any changes. Local newspaper articles with online access related to each weekly topic, providing data that this group could present their arguments.

Presentation Group: Informative presentations prepared by the first researcher on each issue were made to the participants in this group. These presentations contained interesting information and photographs related to the topics covered. As the presentations were being prepared, both positive and negative aspects of the topics were incorporated in a multidimensional manner. Presentations were supported with photographs and cartoons to enhance participants' interest. The presentation group's participants were able to use the information, photos, and cartoons provided in these presentations as data to support their arguments.

In addition to the information that the study groups obtained from these data sources, the written texts provided in the argumentation sheets and the short conversations with the researcher were also data types related to the relevant data source for each of the three groups. The other type of data that participants were able to use in their arguments was any data acquired from their daily lives. This type of data includes data generated from a range of daily life experiences, including from events, situations, and people encountered in their homes, in school, and in the wider world.

The Role of the Researcher

As mentioned earlier, the implementations of the research were carried out by the first researcher. In this process, the researcher has assumed an objective role in general and has had to assume different roles in different stages of the research. First, the researcher has taken an active role throughout the argumentation training to recognize and reinforce the interaction between the researcher and the participants. In addition, the participants have introduced the process clearly and concretely in order to be able to adapt to the argumentation process, she helped the participants in the related events by expressing what she expected from them.

In the real argumentation process, the researcher was in a passive role at this time in order to make the participants more active via her guiding position. In this context, in the small group discussions, the researcher closely followed the participants' discussions in each group but did not intervene. She has only guided in order that the discussions can proceed in the context of the questions on the argumentation worksheets. In addition, the researcher, who has helped to incorporate participants to the discussion with less or no talk within the group, has provided a different viewpoint or a question to continue the discussions by pointing out where the discussions are stuck. Likewise in the whole class discussions, all members of the groups were given the right to speak in order to try to include all group members in the process. The researcher, who is careful not to go beyond the subject of discussions, does not directly explain her opinion or beliefs when asked about the idea.

The researcher, who also played a passive role during the interaction of the participants with the data source, closely watched the participants and helped them to interact with the data source. More specifically, in the outdoor group, she stepped in and tried to create an interesting conversation environment when it was difficult for the participants to ask questions throughout the interactions with their stakeholders. In the newspaper group, she made the necessary remarks about reading the newspaper articles carefully and reflecting the information which the participants gathered from the news they reviewed into their arguments. In the presentation group, she tried to establish a two-way communication by taking the participants' questions or contributions instead of one-way communication during verbal and visual presentations.

Coding Process and Analysis of the Data

For the analysis of the data, the audio and video recordings, which were first brought together in the electronic environment, were deciphered as the students told them, without changing the location of any sentences. The content analysis method was applied to determine the expressions expressed by the students belonged to which argument component. In the analysis process, the argumentation involved taking into account the claim, data, warrant, backing, and rebuttal components of Toulmin's (1958) argument model, and coding was done on all components.

The coding process was completed in three steps. First, a comprehensive field survey was performed and a coding framework was established to indicate to which argument component which expression was to be coded. Subsequently, the first author and a field specialist who has received a master's degree in the field of argumentation have been independently coded a section according to the framework of the components that bet. After the points of "sight association" and "sight separation" between the two researchers' coding were determined, the consistency between the two researchers was determined as 81% by using the "Reliability = Sight Association / (Sight Association + Sight Sepearation)" reliability calculation formula proposed by Miles and Huberman (1994). While this compliance is considered reliable when it is above 70% according to various references (Miles & Huberman, 1994; Yıldırım & Şimşek, 2006), the coding results of the two researchers had been compared to achieve a higher consistency. The differences and the reasons of these differences between the results were discussed together, and by this way they reached a consensus in coding process. A second set of data, which was the result of the identification of a coding framework in which both researchers agree, was still coded independently. Thus, the consistency between researchers increased to 91%. It had been determined that this consistency was a valid reliability, but since the data to be coded were too much, it was not possible for the field expert to take as much time, so the rest of the coding should be continued to encoded by the first author.

In the second step, the first author re-encoded a different set of data with a one-week interval to check coherence in her coding. Using the reliability calculation formula proposed by Miles and Huberman (1994), the consistency coefficient between the two codes was calculated as 94%. The first author, who had a sufficiently high compliance, coded the rest of the data set alone. Although the first author passes through the codings several times, it was thought that it would be more meaningful for a third researcher to control the codings in order to increase the reliability.

In the final stage, the data set coded by the first two researchers was also coded by the second author, and the percentage of agreement between the first and second author was 87% in the first and 94% in the second. Because of the high percentage of adaptation, the second author coded 10% of the entire data alone. Thus, at least 10% of the entire data was coded by both authors. In the following process, the second author checked all the data that the first author coded alone. Thus, the reliability of coding was improved by examining the whole data set by both authors.

Since this article examines the data component that students use in their arguments in five different socioscientific issues, all the operations after the coding process have continued through the data component. A data component is information that participants use as evidence to support the claim. This information may be related to the data sources in which the study groups interact in this research, as well as to the daily lives of the participants. In this context, it had been determined how many data components were used in the arguments in each context of the study groups when the data component quantity was determined. When the quality of the data component was determined, it was discriminated whether the data items used by the study groups belong to the data sources they interact with or their daily lives.

Results

The frequencies of the data components used in the arguments produced by each study group, in relation to each of the five different local socioscientific issues, were first given as figures for each group and the findings obtained for each group were then compared.

Data Component Frequencies of the Outdoor Group

The frequencies of the data components used by the outdoor group in the framework of local socioscientific issues covered in the research are shown in Figure 1.

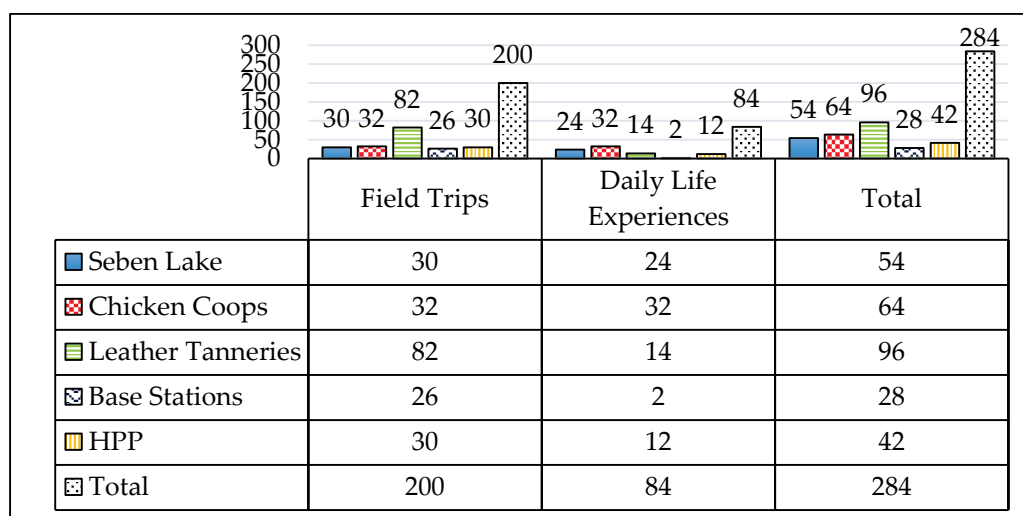


Figure 1. Outdoor Group's Data Component Frequencies According to the Issue

Figure 1 shows that a total of 284 data components were used in the arguments produced by the outdoor group during the research and that a vast majority of said data ($f = 200$, 70%) related to the field trips in which participants participated. In terms of comparing each issue, it can be seen that the highest amount of data ($f = 96$, 34%) was used in the context of the leather tanneries, whereas the least amount of data ($f = 28$, 10%) was employed in reference to base stations. The data that this group used for all content, except for the chicken coops, was mostly related to the field trips. In the case of chicken coops, the data component frequencies ($f = 32$, 50%) for field trips and daily life experiences were equal: this issue was the topic that this group's participants were able to draw upon from their daily life experiences to the greatest extent. The following are examples of the data components employed in the participant arguments in this context:

Ezgi: We went to Akpiliç, the slaughterhouse; the man there said to us that 300,000 chickens in a day were cut in Erpiliç and Beypiliç. (Data related to field trips). When we think about all the chickens that are sold, it is a huge figure. Then, I think the chicken coops put Bolu in the spotlight, promote Bolu for advertising.

Irem: I said that my grandfather was rearing chickens. He works in a chicken coop. There is not really that strong a smell. It only smells a bit just after the chickens have left the coop and gone to the slaughterhouse. Then the smell is gone and it does not smell too much. The dead ones are separated; my grandfather separates them all. Then the good ones go to the slaughterhouse. After they go to the slaughterhouse, the coop is washed. There are plates and so on there. They are all washed and then put back. It only smells for 2–3 days when the chickens leave. Then there is no smell. (Data related to daily life experience).

The outdoor group used data component related to field trips mostly in the arguments about leather tanneries. The following is a quote containing a data component that one participant used in her argument:

Özge: There were many hides. The first raw material was so unpleasant that I did not think it had anything to do with the leather we had just seen! It smells very bad. (Data related to field trips). Also, if I were from Gerece, I would really complain, as that smell is really unbearable.

The following are quotes from the arguments of two participants in the outdoor group, using data related to both field trips and daily life experiences in the content of base stations:

Erkan: In the place, we went to, they said that the base stations were burning plants, but they did not bring any engineers! (Data related to field trips). Maybe their plants are burnt in different ways.

Emir: [...] so, it will be ok even if they will not give money. It depends on your situation... So, if you had a negative thought, it would be different. It would be better to have positive thoughts. For example, what if you talk to your mother but your mother is somewhere else, not nearby. You go to a corner of the house; the phone is suddenly cut off. (Data related to daily life experience). What are you going to do for phone calls? I think base stations are useful for mobile phone call not harmful.

Data Component Frequencies of the Newspaper Group

The frequency of the data component used by the newspaper group, in their arguments relating to the local socioscientific issues covered by the research, is shown in Figure 2.

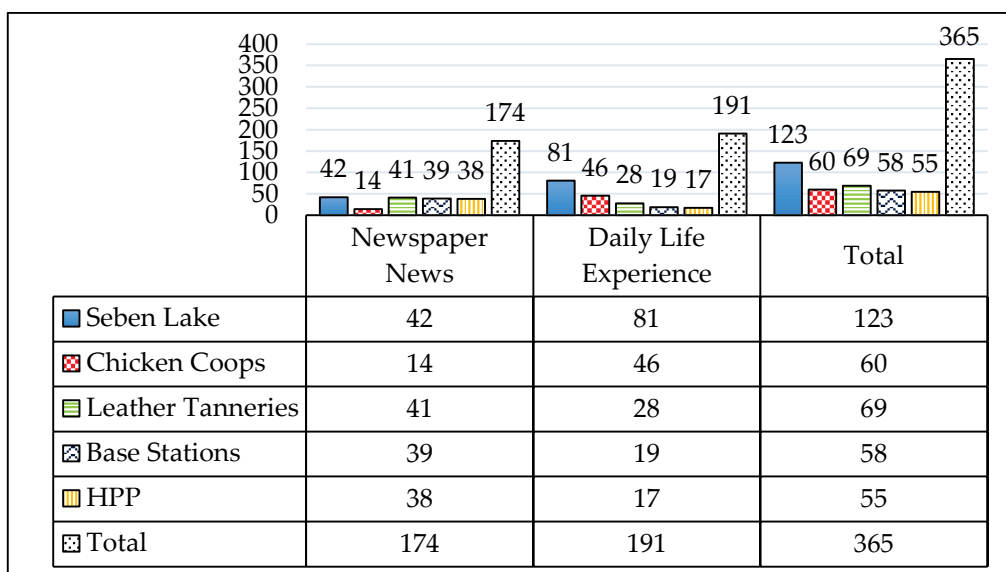


Figure 2. Newspaper Group’s Data Component Frequencies According to the Issue

Figure 2 shows that a total of 365 data components were used in the arguments produced by the newspaper group during the research and that 52% ($f=191$) of data related to their daily life experiences. Comparing the results across the different issues, it can be seen that the highest amount of data ($f=123$, 34%) was used in relation to Seben Lake, while the least ($f=55$, 15%) was employed in the context of HPP. The data component in the arguments used by this group was based more on the daily life experiences when referring to the issues of Seben Lake and the chicken coops, but in other cases, this was more likely to be based on newspaper articles. The Seben Lake issue, which had the highest frequency of all issues, was also the issue most frequently referred to using data related to newspaper articles ($f=42$, 24%) and daily life experiences ($f=81$, 42%) at the same time. Below are some examples of data components used by some participants in the group in their arguments related to this issue:

Mervenur: We now say that with the filling of the artificial lake, it has caused the humidity to increase in the summer season. Now (she reads news), "The Lake is about 1400 meters, we are 726 meters as the Bolu Center. The water that evaporates there collides with the mountains with the wind current, climbs up and falls quickly. If we were up there, it would not have come so fast. So the humidity could not be felt so intense". (Data related to newspaper articles). Therefore, the increase of the humidity has a very important effect on people and nature.

Melike: I think it should not be opened because I believe that there are plants there, which people could harm. We can see that there is a lot of garbage in Lake Abant (Data related to daily life experience). If more people come to the lake and it gets dirty, I think it will damage the plants, animals, everything. That's why I'm saying it should not be opened.

One of the arguments participants formed related to the content of chicken coops—where using data based on newspaper articles was minimal as data based on everyday life experiences was more common—is given below:

Aslı: I also think that it should not be removed, if it is removed, our source of protein will be gone! You know that we eat the meat from these chickens and that meat is protein... Then these chickens lay eggs. Eggs are also a protein. (Data related to daily life experience). Moreover, I also think that white meat is healthier.

The issue of HPP, where the least amount of data was used to all issues, was the area in which participants employed the least amount of data related to daily life experiences. The statement of one of the participants, who chose to support their arguments with data obtained from newspaper articles, was as follows:

Akifcan: In order to persuade my friend, I would first say that HPPs are harmful to all creatures living here. They also disrupt the flow of the water and the villagers are not very pleased with this situation. They cause financial difficulties; for example, there is riot about the dams in the village of Kayabükü. The water there overflowed and there was a flood. Because of the flooding, the authorities want the agricultural land there, and villagers do not want it because the financial situation there is troubled [...] There is such news (Data related to newspaper articles).

Data Component Frequencies of the Presentation Group

The frequency of the data component used by the presentation group (the final study group in this research) and their arguments formed within the framework of the local socioscientific issues covered in the research is shown in Figure 3.

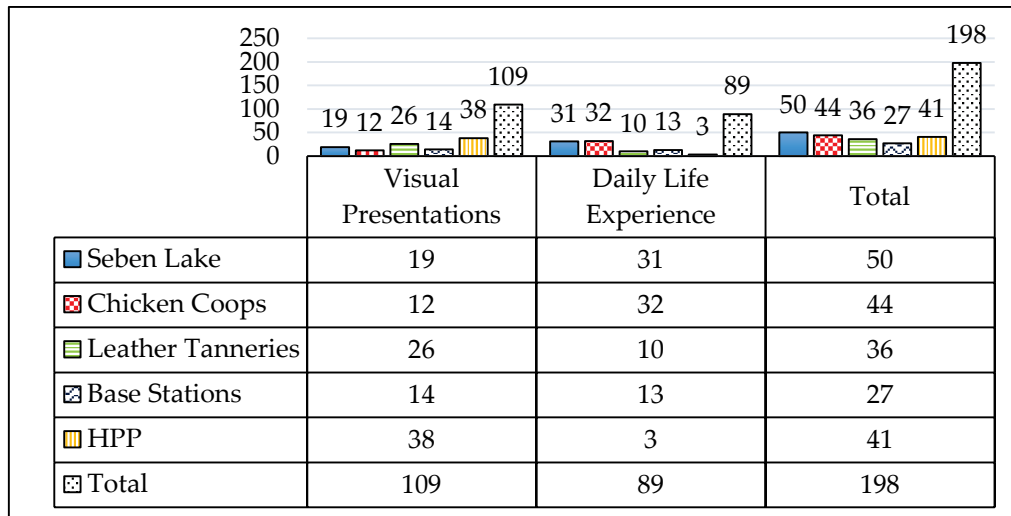


Figure 3. Presentation Group's Data Component Frequencies According to the Issue

According to Figure 3, the presentation group used a total of 198 data components in their arguments produced during the research, and about 55% ($f=109$) of data were related to the visual presentations seen by the group. In terms of comparing the different issues, it was found that the highest amount of data ($f=50$, 25%) was used in relation to the issue of Seben Lake and the least amount ($f=27$, 14%) in the case of base stations. This group used more data components based on the visual presentations on all issues, except in the cases of Seben Lake and the chicken coops. Across all issues, HPP had the highest data ($f=38$, 35%) usage based on visual presentations, but the lowest data ($f=3$, 3%) usage based on daily life experiences. The following is an excerpt from the argument of a participant maintaining that the construction of HPP should not be continued:

Elif: As it accumulates, water evaporates and creates moisture. Humidity disrupts the climate, increasing temperatures. (Data related to visual presentations). I mean people are overwhelmed by the high temperatures. So I believe it should not be continued. Besides, people's houses are under water. (Data related to visual presentations). No one has the right to do this, so how can you do something like this to my house!

An example of arguments related to the chicken coops issue, which had the highest data usage based on daily life experiences and where the use of data based on visual presentations was minimal compared to HPP, is cited below:

Ece: My evidence is that pigeon lice will itch people! And their odor is too much! I know this from my friend who could not even get in her door. Those who live near her house are already complaining! (Data related to daily life experience).

An example of a data component affected by a visual presentation, used by a participant in her argument related to the leather tanneries, is the following:

Tuba: You showed the roof of a factory (Referring to a photo in a visual presentation), where there was leather everywhere. (Data related to visual presentations). Where are all these animals coming from?

Another participant expressed her argument, using data from the information she had acquired in her daily life, as follows:

Ece: If they really want to process the hides, they should give them to the wild animals. They eat hides! (Data related to daily life experience).

The last example of the data component comes from one of the participants who formed an argument related to the issue of base stations:

Tuba: 23 of the 39 people in Ömerler Village who had cancer died. (Data related to visual presentations). Surely this will negatively affect the psychology of other people? So if the base station continues to be installed there, their mental health will worsen! So if they get cancer, we could too.

Given the findings obtained from the study groups, evaluated by examining the three figures, the following points can be observed:

- With respect to data component frequency in the arguments generated during the research, the highest level was found in the newspaper group, followed by the outdoor group, and finally the presentation group.
- Following the content-based examination, it was found that participants in the outdoor group used the highest number of data components in reference to leather tanneries and the least in the context of base stations. The newspaper group's participants used data components most frequently in relation to the issue of Seben Lake and least frequently when discussing the HPP content. The participants in the presentation group used data components most often in the context of Seben Lake, similar to the newspaper group participants; however, in terms of frequency of data components, they referred to base stations in the same way as the participants in the outdoor group.
- In terms of whether the data were used more in relation to the source provided to each group or with reference to their daily life experience, it emerged that the quality of data used in the outdoor group's arguments was related to the field trips they experienced. Similarly, in their arguments, the presentation group used data related to visual presentations that they had seen. Conversely, the newspaper group was more likely to use data from their daily life experiences in their arguments.
- In the content-based analysis, it was found that participants in the outdoor group most frequently used data based on the field trips when discussing the issue of leather tanneries, and least frequently used data from their daily life experiences when discussing the issue of chicken coops. The newspaper group most frequently used data based on daily life experiences and the newspaper reports in the context of Seben Lake. Finally, it was found that the presentation group used data based on the visual presentations most often in the context of HPP, and that, with regard to the issue of chicken coops, data based on their daily life experiences were used in the same way as the outdoor group.

Discussion, Conclusion, and Suggestions

The aim of this work is to determine the frequency of the data component used by seventh grade participants in their arguments related to five different local socioscientific issues. This has been achieved by providing a closer look at the data component in argumentation processes– one of the essential components that should be addressed, in terms of quantity and quality, in such analysis. In line with this aim, the study groups drew upon the data they were exposed to through their respective data source, incorporating this information into the argumentation process in order to support their claims. Analyses made based on Toulmin's (1958) argument are first described in terms of the frequency of the data components used in each study group's arguments. A comparative analysis is then conducted, considering these frequencies in relation to the different data sources and the interaction in question.

According to the results of the research, the newspaper group used the data component most frequently in their arguments, and the presentation group used the least. With this result, the use of more data components of the newspaper group does not mean that they use better data components than the other groups or the use of less data components of the presentation group does not mean that they use worse data components than the other groups. The process of reasoning and integrating data into the structure of the arguments of each group may have been different because the way in which study groups use the information they obtain from data sources may be different. Moreover, while the practices in the outdoor group and newspaper group are appropriate for the constructivist and active learning approaches, the participants in the presentation group are more suited to the traditional teaching method, so the participants in the presentation group may be forced to reflect on the data arguments they have obtained from the learning environment. On the other hand, the participants in the outdoor group interacted with many people and stimulus during field trips, and the participants in the newspaper group read six different news in each content, as well as they interacted with the researcher. On the contrary, the presentation group interacted only with the visual presentation that the researcher had done and they interacted with the researcher during the implementations. Therefore, it can be considered that the information gathered by the presentation group about the data source is more limited than the other groups. This may have caused the presentation group to use fewer data components than others.

Similar results with using data have been found in other studies in the literature. Many researchers have found that students are unable to find evidence to support their claims for a particular topic (Cho & Jonassen, 2002; Evagorou & Osborne, 2013; Ratcliffe, 1997), cannot show sufficient evidence (Sandoval & Millwood, 2005; Skoumios, 2009) and they have come to ignore the evidence (Evagorou et al., 2012). A research of ninth grade high school students conducted by Jiménez-Aleixandre, Rodriguez, and Duschl (2000) reported that only 10% of the students' arguments on the genetics of farm-raised chickens contained data component. Similarly, Sandoval (2003) found that high school students had problems using scientific data to support their claims whereas Dawson and Venville (2009) have found that high school students do not use any data components or use very simple levels of data to justify their claims in their biotechnology arguments. As can be understood from the literature review, students have some problems in using data during the argumentation process. These problems are similar to the problems experienced by the seventh grade students in this research, even though they are in different age groups.

The frequency of the data component, which varied according to the data source of the study groups, also varied depending on the socioscientific issue being discussed. On the one hand, the newspaper and presentation group participants used data components mostly in relation to the issue of Seben Lake, which indicates that this issue is more suitable for data use for the participants in these groups. On the other hand, the use of data components by the outdoor and presentation group participants, at least in relation to the issue of base stations, suggests that the participants in these groups may have had difficulties in using the data to support their claims related to this topic. Namely, in the

interaction of the outdoor group and the electrical-electronic engineer, the engineer described the technical aspects of the subject and expressed the belief that the base stations did not damage health and environment. On the other hand, participants who interacted during the trip to a base station within the neighborhood expressed that these stations were close to their homes, which adversely affected their health and even harmed garden plants. In this case, the participants might remain between two different perspectives and may not prefer to use the views of the people they interact with when constructing their own arguments. Other possibilities may be that the participants did not interact sufficiently with the stakeholders of the subject, they can also be less affected by the trip, or they may have problems in adding the data to their arguments. In addition, since electromagnetic waves are a matter of concern, this issue remains a technical issue in terms of age level of participants, and participants may want to see something concrete. Likewise, for participants in the presentation group, this may be perceived as a technical issue. Furthermore, participants in this group may not have been able to use the information they learned from the oral and visual presentations and the conversations they made with the researcher for supporting their claims in this content as data.

The change in subject content is thought to be influential on the data component quantities used by the study groups, while the inclusion of participants in the socioscientific argumentation process is also influential on the data component quantities they use. In their study of South African students, Braund et al. (2007) have shown that as well as students use the scientific knowledge in socioscientific arguments, they had difficulties finding evidence for justifying their claims which shaped around moral situations and beliefs. In other words, the evidence that can be used in socioscientific arguments is evidence of social, ethical and moral dimensions rather than scientific information (Sadler et al., 2007; Sadler & Fowler, 2006; Zeidler et al., 2002). Thus, participants in this study may have exhibited different performances towards the quantification of data use in different subject content, as they could represent many things as data when dealing with the different dimensions of the five different local socioscientific issues.

Having evaluated the quality of the data, it was determined that the data components used in the arguments of participants in the outdoor and presentation groups were more often related to the data sources with which they interacted, while data usage in the newspaper group was largely based on their daily life experiences. The use of the field trip-based data in the outdoors group's arguments usually correlated with the intended purpose of field trips undertaken in the research. In this way, as Tal (2004) points out, it is understood that field trips facilitate students' ability to visualize and understand controversial issues. It is possible, however, that participants in the outdoor group had limited daily life experience related to these issues. As a matter of fact that the outdoor group used data acquired during the field trip, particularly in reference to the issue of leather tanneries, shows that participants in this group may have been more affected by the trips, the events observed, and the people or the environment encountered; this group often included evidence in their arguments experienced in the field trips, and learned about the related local socioscientific issue. In this context, Tal et al. (2011) point out that field trips support the teaching of socioscientific issues: researchers reported that students in a group communicating online with a patient with cystic fibrosis achieved an effective outcome, while students in another group visiting the hospital and meeting a patient with this disease provided not only an outcome but also a deeper understanding of the cognition behind the cystic fibrosis disease. It has also been found that field trips make it easier for students to construct stronger and more relevant judgments regarding the topic in question when deciding whether or not to volunteer to participate in a fund-raising program. Similarly, Evagorou (2011) found that a visit to a pig farm, in relation to a debate on the removal of a pig farm, had a great deal of influence on the evidence that students used to talk about the topic and to support their arguments. The common point of the results obtained from these studies is that field trips have a multifaceted effect, appealing to students' sensory, psychomotor and cognitive skills.

The presentation group's use of data, based mostly on the visual presentations and to a lesser extent on their daily life experiences in the context of HPP, suggests that participants in this group have not been exposed to this issue in their daily lives. In other words, it is estimated that the HPP content was unfamiliar to the participants in this group, and they thus used evidence in their arguments related to what they had seen, heard and learned from the data source. Considering the interactions with the data source as well as the interactions with the researcher, it can be assumed that the participants in this group directly used this knowledge, without adding too much to themselves on the limited knowledge they acquired about HPPs. Since students tend to incorporate the information provided in the activity into their arguments (Sampson, Simon, Amos, & Evagorou, 2011) when constructing their arguments the presentation group participants referred to the pictures they saw during the visual presentations and to the information they received. This result is similar to the results of Şahin's (2014) study of fourth and fifth grade students who used visual and scientific evidence but showed moderate evidence of using their skills.

The fact that newspaper group participants used data based both on their daily life experiences and on newspaper articles in their arguments made in the context of Seben Lake suggests that this issue is particularly important to this group. This may be due to the fact that some of the participants in the group are from Seben or that those who have seen the Lake before are aware of the characteristics of this environment. Another reason may be that the Seben Lake topic attracted more interest from the participants, thus laying the ground work for further evidence through increased participation in the debate. The group's use of data in their arguments relating to the chicken coops was based largely on daily life experiences rather than newspaper articles; this could be due to the fact that some of the participants' families are involved in this work and that some of them even own chicken coops. In short, it is thought that the group's increased personal exposure to these two issues makes them use informal evidence (Tytler et al., 2001) and that students use evidence in their arguments based on how they perceive the issue prior to a discussion (Evagorou et al., 2012).

The alleged claims in the newspaper articles and evidence used by participants to support said claims were different from what had been anticipated by the researchers; it was assumed that such claims would provide a data source for the participants in the newspaper group and would, therefore enable them to incorporate more data components into their arguments. On the contrary, it is now believed that the arguments contained in these reports motivated participants to consider their daily life experiences, encouraging them to support their arguments with examples and information from their own lives. On the one hand, in the other two groups' field trips and visual presentations was a ready-made data source for visually influencing the participants particularly in the outdoor group where there were more opportunities for participants to incorporate into their arguments the situations/events they encountered on trips. On the other hand, it is only possible to facilitate the use of newspaper articles as a source of data, if a critical reading of the content is conducted by participants. Indeed, many studies have found that students tend to read science-related news without using a critical point of view (Dawson & Venville, 2009; Tsai, Chen, Chang, & Chang, 2013) and that they are generally not trained in critical thinking (Pellechia, 1997). In a study conducted by Phillips and Norris (1999), students were found to be unable to identify the structure of argument, including such elements as warrant and evidence, in science-related news. In another study yielding similar results, it was found that middle school students tended to cite the news directly, rather than using newspaper articles as content information to support their arguments (Ratcliffe, 1999).

In this study, middle school students were taught about five local socioscientific issues through three different data sources, and the data they acquired from each of these data sources were then incorporated into their argumentation processes. Thus, students are able to make arguments and make decisions about the real problems that take place in the city where they live. In this sense, it is thought that this research will be an example for educators who want to bring the problems in other cities or even anywhere in the world to the classroom environment. Especially local socioscientific issues will enable students to be sensitive to the problems of the whole world, starting from the problems in the

world they live in. With this belief in mind, researchers primarily recommend that science teaching programs include more such issues.

While the study groups involved in the research were able to integrate the data they obtained from the data sources into their arguments appropriately, the quantity and quality of the data component used in their arguments varied according to the data source itself and the issue discussed. In this context, it is clear that field trips, newspaper articles, and visual presentations used as data sources in this study can be easily used with different age groups and in relation to different issues when structuring argumentation. While these implementations are not new implementations, they may be differentiated in terms of usage and become more innovative implementations. In particular, the inclusion of examples of these implementations in the training of teacher candidates and in-service teachers will take different perspectives into action. As a matter of fact, in a study (Türkmen, Pekmez, & Sağlam, 2017) in which pre-service science teachers were investigated for their ideas about socioscientific issues, almost half of them were found to want to use an inquiry based research approach in the teaching of these issues when they started to work. It is a positive sign for the pre-service science teachers that to be able to choose the teaching method or technique related to the teaching of socioscientific issues. However, they should see the positive implications for these elections. For this reason, the use of data sources in this study will be concrete examples. Besides, field trips and visual presentations facilitate students' ability to justify their claims; however it will be more practical to organize these trips by a crowded team, since field trips require a different labor in terms of cost, time and energy than others. It has been also found that the using of newspaper articles during argumentation about socioscientific issues is more effective than the using of activities in the current science curriculum for development of critical thinking skills of seventh grade students (Sevgi & Şahin, 2017). Nevertheless, it is thought that the careful examination of newspaper articles, under the guidance of teachers, is more effective. The news should be carefully selected in terms of content, accuracy and reflection of multiple viewpoints. The subject matter also affects students' use of data in the argumentation process, so it is necessary to select issues appropriate to students' level and interest. Dealing with local socioscientific issues emerged students' lived environments, in particular, will provide both increasing the participation of students into the discussions and well-developing their making decisions skills.

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Appendix 1. WHERE ARE THE CHICKENS WE EAT GROWN?



An image from the chicken coops

When chicken meat is called, one of the places that comes to mind is Bolu. Bolu is a famous city that meets 40% of the need for poultry (white meat) of Turkey. In our city, there are approximately 5000 (estimated) chicken coops and six factories (integrated facilities). The chicks are first grown in chicken coops and then sent to the factory to make it suitable for sale. They are distributed to many places of our country and become food sources for us as meat and eggs. In our city, turkey (pink meat) production is also made in addition to chicken production. The industry in Bolu is highly developed in terms of poultry breeding. Both the plant owners and those working in this

establishment get economic income from these plants.

Chicken coops are usually located outside the city, close to the villages. Wastes from the coops and unconscious pouring of chicken pellets (feces) into agricultural land spread the bad smell to nearby villagers. Some villagers complain of this smell. Especially in the summer months and with the influence of the wind, this smell can reach the city center.

Some villagers' pointed out that their ideas were not taken during the establishment phase of the chicken coops. They say that the damage is not only to themselves, but also to the animals, because the animals died because of the poisonous substances in the end fertilizer which feed the chicken manure of the bovine animals. Moreover, it is said that in these chicken coops, there are no workers from the villages and owners are bringing workers from outside the village. One of the villagers who argues that it is not right to get economic income in this way states his complaint with the following words;

"People who are not familiar with our village, who we do not even hear their names, are trying to make a chicken coops by buying land from secretly. We do not want these farms, which we only suffer from damage that will benefit those who have no interest in us who have capital, but who will disturb the villagers of 50 households. "

The bad smell and wastes that arise in these facilities lead to another problem on hot days. Small insects called "pigeon bits" are spreading into the air in the summer months for the last three or four years, sticking to people's clothes and their bodies, causing itching. These lice are claimed to originate from chicken coops spread all over Bolu. There is no solution to the pigeon lice that even the pesticides do not affect.

According to experts, fertilizers from factories and chicken coops spread to agricultural land without waiting, burning plants and reducing the yield of the fields. In addition, the liquid in the chicken breed contaminates our waters when leaking into the ground. Fertilizer is not beneficial when it is used without proper processing. Besides, it is also disturbing in terms of environment view.

Some villagers want to build these coops farther away, but some do not want to build chicken coops near their villages at all. There has been no clear decision on what to do with chicken coops in Bolu, which has been an environmental problem for many years.

Please consider the scenario you read above and answer the following questions:

<p>1. Do you have any chicken coops or farms near your home? (Please indicate)</p> <p>Yes, there is <input type="checkbox"/></p> <p>No, there is not <input type="checkbox"/></p> <p>I do not know <input type="checkbox"/></p>
<p>2. In your garden, on the street, at a picnic, etc. have you been exposed to smells coming from chicken coops? (Please indicate)</p> <p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p> <p>I do not remember <input type="checkbox"/></p>
<p>3. Those who want to build chicken coops think that these coops will make an important contribution to chicken production, that many workers will gain from this and that the city will develop. But on the other side the villagers and the people of Bolu, who are disturbed by this smell want these poultry to be removed from the city.</p> <p>Do you think chicken coops should be removed from our city? Or not? (Please indicate)</p> <p>Yes, it should be removed <input type="checkbox"/></p> <p>No, it should not be removed <input type="checkbox"/></p>
<p>3a. Explain your answer with reasons (warrants).</p>
<p>3b. Suppose your friend defends opposite of your idea of the removal of chicken coops. What might be the reasons for your friend to think this way?</p>
<p>3c. If you had to persuade the people who advocated the exact opposite of your idea of the removal of chicken coops to the truth of your idea, what evidences would you use to persuade them?</p>
<p>4. What do you recommend the government authorities to take to prevent the environmental problems of chicken production facilities? Explain your answer with reasons (warrants).</p>