

PART 2: Construction of Arguments on Socio-scientific issues (SSIs)

First activity: Socio-scientific issue: *Consumption of bottled Vs tap water* (15 min)
(Individual, group work and plenary)

The participants are divided in six groups: Groups 1, 2, 3, 4, 5, 6

Each participant is invited to read a socio-scientific issue entitled *Consumption of bottled Vs tap water*, as well as evidence and positions about this socio-scientific issue. Evidence and positions should be evaluated for validity and reliability.

Consumption of bottled Vs tap water

Last week, in the city where you live, there was a strong debate whether the citizens should drink bottled or tap water. This debate is a result of local television news in your city that claims that tap water is not suitable for consumption.

The city's municipal authorities and representatives of the State Laboratory, argue that the tap water is suitable for consumption and there is no danger by consuming it.

Another group of experts dealing with health issues, as well as importers and retailers of bottled water argue that the only safe drinking water is bottled water. Moreover, they argue that although it costs slightly more than the tap water, its advantages are so numerous that is worth to buy it.

You are called to take an informed decision regarding the dilemma in your city: “Are you in favor of bottled or tap water?”

Example of evidence and positions about the SSI: Consumption of bottled Vs. tap water”

Person/Organisation	Evidence/Position
Chemist Water Board of Cyprus (2014)	Tap water is already treated to remove particles, chemicals and bacteria. During the process of treating public water, chlorine is added as a disinfectant, and fluoride is added for its dental health benefits.
American Journal of Epidemiology (1998)	Scientists say chlorination can produce at least one group of chemical by-products, trihalomethanes, that are considered carcinogenic. But studies over the years have differed on whether levels of these compounds in tap water adversely affect health.

Professional blog (2008)	Bottled water wastes fossil fuels in production and transport. Bottled water production in the United States used the energy equivalent of 32 and 54 million barrels of oil to produce and transport plastic water bottles in 2007—enough to fuel about 1.5 million cars for a year. Rather than being recycled, about 75 percent of the empty plastic bottles end up in our landfills, lakes, streams and oceans, where they may never fully decompose.
US Container Recycling Institute (2005)	Plastic is not only toxic for human organism, but also highly toxic for the environment. The US Container Recycling Institute estimates that 67 million plastic water bottles are discarded every day. That is enough plastic water bottles to wrap around the planet 149 times each year.
WHO (2010)	Several agencies, including the World Health Organization, say the evidence is weak and point out that any risk from chlorine by-products is tiny compared with risks associated with non-chlorinated water. Many countries that have relaxed chlorination standards have seen outbreaks of cholera and other diseases.
Journalist - newspaper article (2013)	In reality, bottled water is just water. That fact isn't stopping people from buying a lot of it. Estimates variously place worldwide bottled water sales at between \$50 and \$100 billion each year, with the market expanding at the startling annual rate of 7 percent.
Layperson (2015)	The only safe drinking water is bottled water. Chlorination of water is carcinogenic.
Expert for health issues (2016)	Plastic for bottled water is not toxic. The modern high know-how guarantees its appropriateness for human health.
FDA (2005)	Migration of harmful substances of plastic is possible only when the bottled water stays in sun.
Etc.	

II. (a) The participants are invited to think about the importance of using multiple sources for the construction of arguments on socio-scientific issues. (Individual work)

(b) The participants are invited to think about the importance of constructing different types of arguments on socio-scientific issues. (Individual work)

III. Reflection and discussion (Group work and plenary)

Second activity: Construction of different types of arguments Instrument (20 min)

(Individual, group work and plenary)

The participants are divided in six groups: Groups 1, 2, 3, 4, 5, 6

Groups 1, 2, 3

Each participant is invited to write arguments for consuming tap water, using the following Instrument. (Individual work)

Groups 4, 5, 6

Each participant is invited to write arguments for consuming bottled water, using the following instrument. (Individual work)

INSTRUMENT

Consumption of bottled Vs tap water

Instructions: Read the scenario about “*Consumption of bottled Vs tap water;*” and answer the following questions, using the sheet with the extra information. There are no right or wrong answers.

Questions

The city's municipal authorities and representatives of the State Laboratory in your city, argue that the tap water is suitable for consumption and there is no danger by consuming it. They also affirmed that tap water costs a pittance compared to bottled water.

Another group of experts dealing with health issues, as well as importers and retailers of bottled water argue that the only safe drinking water in your city is bottled water. Moreover, they argue that although it costs slightly more than the tap water, its advantages are so numerous that is worth to buy it.

PART A

1. Regarding the dilemma in your city, are you in favor of bottled or tap water?

Underline as: Bottled water / Tap water

2. If you want to convince a friend about your position, which arguments will you propose to convince him/her? (Write different types of arguments according your opinion)

Social argument: _____

Ethical argument: _____

Economic argument: _____

Scientific argument: _____

Other kind of argument: _____

PART B

1. If somebody holds an opposite position from you on this issue, which arguments may he/she have? (Write different types of arguments according your opinion)

Social argument: _____

Ethical argument: _____

Economic argument: _____

Scientific argument: _____

Other kind of argument: _____

PART C

1. According to the argument you have mentioned in Part B, can you write down your opposite ideas to justify your position? (Write different types of arguments according your opinion).

Social argument: _____

Ethical argument: _____

Economic argument: _____

Scientific argument: _____

Other kind of argument: _____

Third activity: Self-assessment and hetero-assessment of arguments (20 min)

(Individual and Group work)

The participants are divided in six groups: Groups 1, 2, 3, 4, 5, 6

I. Each participant is invited to assess his/her own arguments' quality, using the Arguments' Quality Rubric (Sadler & Fowler, 2006) (Individual work)

II. Each participant is invited to assess the quality of arguments of other participant of his/her group, using the Arguments' Quality Rubric (Sadler & Fowler, 2006) (Individual and Group work)

Fourth activity: Group Debate (15 min)

Groups 1 and 2 will support the position in favor of bottled water

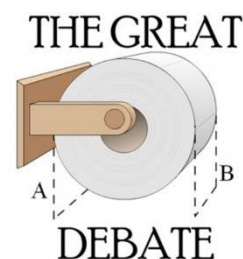
Groups 3 and 4 will support the position in favor of tap water

Arguments Pro and Con will be expressed by opposing groups interchangeably in two discussion cycles.

Groups 5 and 6 will be the observers. You will act as the barometer.

Your task is to discuss in your group, refine your opinion and place yourself on the appropriate position on the opinion scale.

Depending on the arguments presented by the opposing groups, you may change your position.



Final Reflection and Discussion (joined groups) (10 min)

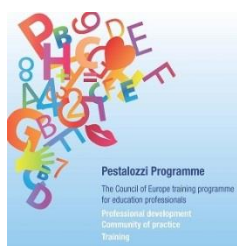
(Individual and plenary)

I. What is the first thing you remember from this workshop?

II. Do you think that is possible to deal with socio-scientific issues by using similar learning processes with yours students? Please, give an example.

III. Do you think that this practice could be an “effective” instructional practice in enhancing critical thinking as a citizenship competence? Please, explain your opinion.

IV. What does learning to think critically as a social process at classroom level actually mean?



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Andreani Baytelman, Ph.D., Cyprus Pedagogical Institute.

