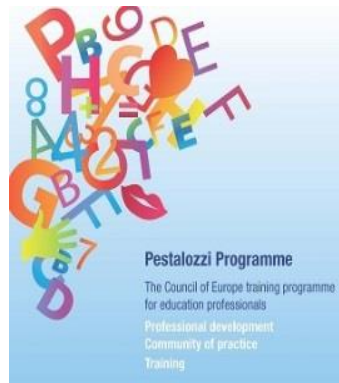


PROMOTING CRITICAL THINKING THROUGH ARGUMENTATION ON SOCIO-SCIENTIFIC ISSUES



**Pestalozzi workshop: "Critical Thinking as a basis for democratic participation",
11-13 October 2017, Nicosia, Cyprus,
Dr Andreani Baytelman, Cyprus Pedagogical Institute**

Introduction

Focus

This workshop focuses on instructional strategies and practices at the **level of the classroom**, for **enhancing critical thinking** as a **citizenship competence**.

Keywords

Argumentation, construction and evaluation of arguments, critical thinking, debate, decision-making, socio-scientific issues.

Introduction

Argumentation for enhancing critical thinking

we use **controversial socio-scientific issues**, which are important **dilemmas to human society** in general, in order to promote argumentation and decision-making skills.

(Sadler & Zeidler, 2004; 2005b).

The workshop in a nutshell

PART A: Definitions/Conceptualizations

What is an argument?

What is a counterargument?

What is argumentation?

Evaluation of arguments

Argumentation and Socio-scientific issues

PART B: Construction of Arguments and Argumentation / Debate/Decision-making

Socio-scientific issue: *Consumption of bottled Vs tap water*

Assessment of arguments

Group Debate, Decision-making

GUIDELINES

FOR THE IMPLEMENTATION OF THE WORKSHOP

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

Individual work, Group work and Plenary

You have fixed time to work on the provided educational activities (individual and group work)

Write down your answers on the provided Worksheets

A member of your group needs to present the outcome of your work.

The workshop: PART A



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First activity: What is an argument?

<https://www.youtube.com/watch?v=hQNCdATKeTc>

1. Each participant is invited to write three (3) arguments in favor of consuming tap water or of consuming bottled water.

2. Each participant is invited to write:

(a) What is an argument?

(b) What is a counterargument?

(c) What is argumentation?

3. Reflection

A member of your group needs to present the outcome of your work.



VS



First activity: What is an argument?

(a) What is an argument?

- An argument is an assertion and is accompanying justification.
- An argument is a conclusion supported by at least one reason.
- An argument consists of one or more statements that are used to provide support for a conclusion.

(Toulmin, 1958; Halpern, 1989; Kuhn, 1992; Means & Voss, 1996; Zohar & Nemet, 2002).

First activity: What is an argument?

(a) What is a counterargument?

- A counterargument is a viewpoint that opposes your main argument.
- An argument put forward to oppose an idea or theory developed in another argument.

(Kuhn, 1992).

First activity: What is an argument?

(a) What is argumentation?

- Argumentation is a verbal and social activity of reason aimed at increasing (or decreasing) the **acceptability of a controversial standpoint** for the listener or reader.
- Argumentation is dialectical in nature: at least two **different perspectives** or solutions are **competing** with each another.

(Van Eemeren et al., 1996; Zohar & Nemet, 2002; Walton, 2006).

Second activity: Evaluation of arguments

- 1. Each participant is invited to write assessment criteria in order to evaluate arguments' quality.**
- 2. Each participant is invited to assess his/her own arguments' quality.**

| A/ A | Assessment criteria for arguments' quality | Example of arguments | Score (0-4) |
|---------|--|----------------------|-------------|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |

15 minutes



Second activity: Evaluation of arguments

Argumentation Quality Rubric (Sadler & Fowler, 2006)

| Score | Description | Excerpt |
|-------|---|---|
| 0 | No justification | <i>In response to the reproductive cloning scenario:</i> "Yes, I think so [reproductive cloning should be developed]." |
| 1 | Justification with no grounds | <i>In response to the gene therapy for Huntington's disease scenario:</i> "If they can stop someone from suffering, then sure." |
| 2 | Justification with simple grounds | <i>In response to the reproductive cloning scenario:</i> "I don't think it's right because if you're not able to have a child, ... it's not God's will. If God wants you to have a child, you should have a child, and you will have a child. But if it's not for you to have a child, I mean, I think you shouldn't tamper with it." |
| 3 | Justification with elaborated grounds | <i>In response to the gene therapy for intelligence scenario:</i> "They will develop a dichotomy even more so than we see now with the rich and poor. Now we will have the smart vs. the stupid or those who can afford this procedure and those who cannot. And that will create all kinds of sociological problems. I think that is meddling too much." |
| 4 | Justification with elaborated grounds and a counterposition | <i>In response to the gene therapy for Huntington's Disease scenario:</i> "I think that gene therapy, it should be actually used very sparingly because what it does is narrows the diversity—like everyone gets the good copy now so that is not necessarily good because then we do not have a backup for anything. But in cases like this, where the only cure would be replacing the actual gene, then it could be beneficial ... If there are no other treatments for it, that would be the only way that I would support using gene therapy for something like that. But I think all other means should be exhausted before we start messing with someone's genes." |

Third activity: Argumentation and Socio-scientific issues (SSIs)

<https://www.youtube.com/watch?v=fhQ8ZrklAQc> (1:56 – 3: 09 min)

(a) What is a socio-scientific issue? Examples

15 minutes



(b) Why is important the use of socio-scientific issues in order to promote argumentation skills?

(c) Why is important the use of socio-scientific issues in order to promote critical thinking as a basis of democratic citizenship?

Third activity: Argumentation and Socio-scientific issues (SSIs)

(a)What are socio-scientific issues?

- Socio-scientific issues are those that are based on scientific concepts or problems, **controversial in nature**, discussed in public outlets and frequently subject to political and social influences, with ethical dimensions.
- They are subject to **multiple perspectives and solutions**.

(Galotti, 1989; Binder et al., 2010; Braten et al., 2011; Carlisle et al., 2010; Hivon et al., 2010; Kienhues, 2011; Kolsto, 2006; Kolsto, et al., 2006; Kuhn, 1993; Sadler, 2004; Sadler, 2004; Sadler & Zeidler, 2005; Sadler & Zeidler, 2005b; Sonett, J., 2010; Zeidler et al., 2002; Zeidler et al., 2009; Zeidler et al., 2005).

Third activity: Argumentation and Socio-scientific issues (SSIs)

Examples of Socio-scientific issues

Examples

Causes of climate change

Legalization of marijuana

Gene therapy and cloning

Usage of vaccines

Use of Underground or overhead high voltage lines

Use of cell phones

Genetically modified organisms

Usage of vitamins

Consumption of bottled or tap water

Etc.

Third activity: Argumentation and Socio-scientific issues (SSIs)

(b) Why is important the use of socio-scientific issues in order to promote argumentation skills?

(c) Why is important the use of socio-scientific issues in order to promote critical thinking as a basis of democratic citizenship?

Third activity: Argumentation and Socio-scientific issues (SSIs)

(b) Why is important the use of socio-scientific issues in order to promote argumentation skills?

- They are usually **controversial in nature** and require students to engage in **dialogue, evaluation of information, construction of arguments, discussion, debate and decision making**.
- They require a degree of moral reasoning or the evaluation of ethical concerns in the process of arriving at decisions.

(Kuhn, 1993; Sadler, 2004; Sadler, 2004; Sadler & Zeidler, 2005; Sadler & Zeidler, 2005b; Sonett, J., 2010; Zeidler et al., 2002; Zeidler et al., 2009; Zeidler et al., 2005).

Third activity: Argumentation and Socio-scientific issues (SSIs)

(c) Why is important the use of socio-scientific issues in order to promote critical thinking as a basis of democratic citizenship?

- The discussion, argumentation and debate of controversial SSIs necessitates that students develop many of **the skills and dispositions associated with critical thinking**.
- Additionally, argumentation on SSIs provides an opportunity to practice education for citizenship: Given the nature of SSIs, for the purposes of the classroom practice, a focus on tolerance, mutual respect, and sensitivity must be modeled and expected.

(Wiel Veugelers, 2000; Dam & Volman, 2004; kolsto, 2006;.Kolsto, et al., 2006)

The workshop: PART B



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First activity: Construction of Arguments on Socio-scientific issues

15 minutes



I. 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.

First activity: Construction of Arguments on Socio-scientific issues

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 arguments

Groups 1, 2, 3

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

15 minutes



Groups 4, 5, 6

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

Third activity: Assessment of arguments

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

15 minutes



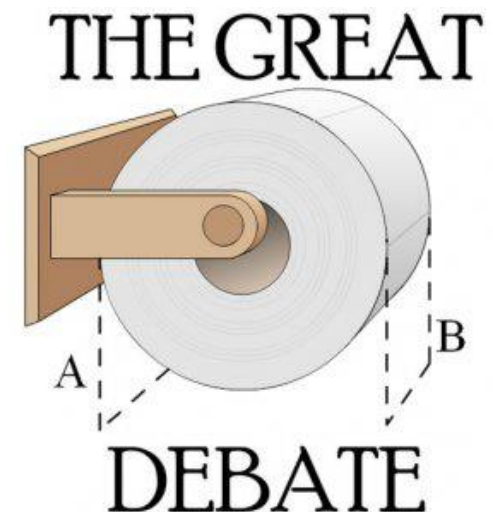
II. Each participant is invited to assess the quality of arguments of other participant of his/her group, using the Arguments' Quality Rubric (Sadler & Fowler, 2006). (Individual and Group work)

Fourth activity: Group Debate

- **Groups 1 and 2** will support the position in favor of tap water.
- **Groups 4 and 5** will support the position in favor of bottled water.
- Arguments Pro and Con will be expressed by opposing groups interchangeably in two discussion cycles.
- **Groups 3 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. Decision-making

15 minutes

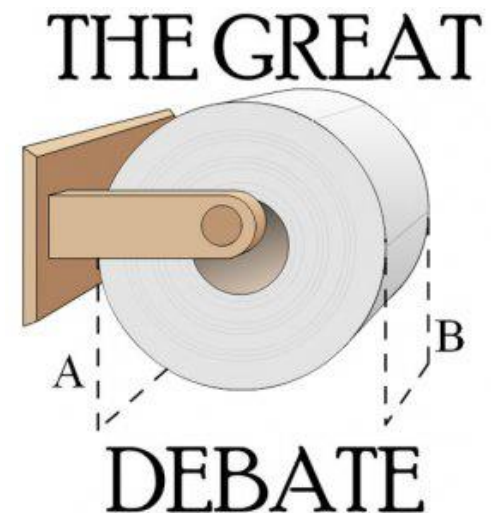


Fourth activity: Group Debate

Guidelines for Debate

- 3 minutes of preparation for each group
- **Groups 1 and 2** present their two strongest arguments
- **Groups 4 and 5** get to reply to the other groups using two counter-arguments.
- **Groups 1 and 2** present their two strongest rebuttals.
- **Groups 4 and 5** present their two strongest rebuttals.
- **Groups 3 and 6** make final decision

15 minutes

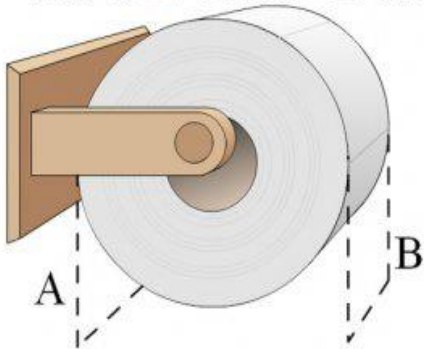


Fourth activity: Group Debate

15 minutes

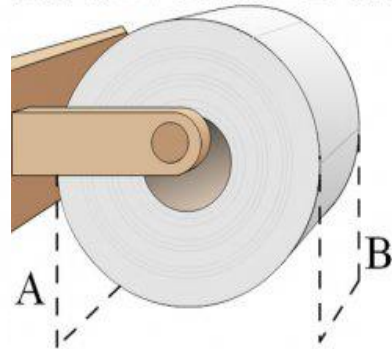


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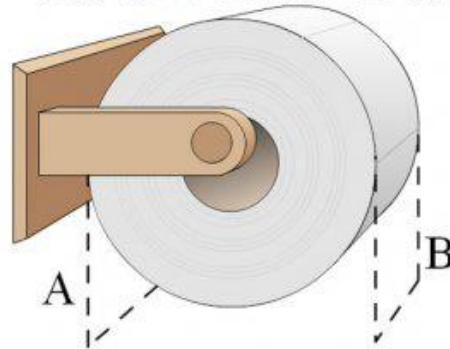
DEBATE

THE GREAT



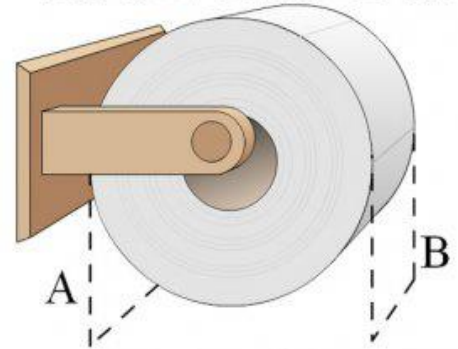
DEBATE

THE GREAT



DEBATE

THE GREAT



DEBATE

Final Reflection and Discussion

10 minutes



- 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?
- V. Each group needs to present the outcome of the work.

Final Reflection and Discussion

Introducing argumentation on socio-scientific issues, we would like to promote:

- Understanding, identifying, constructing, and evaluating arguments.
- Understanding how to improve arguments' quality
- Understanding the epistemological basis of knowledge
- Understanding the nature of socio-scientific issues

Final Reflection and Discussion

Introducing argumentation on socio-scientific issues, we would like to promote:

- Recognizing personal and social values and perspectives that impact on argumentation and decision-making regarding socio-scientific issues
- Evaluating information from different perspectives
- Understanding that deliberative democracies require citizens who are able to discuss controversial issues
- Enhancing critical thinking as a citizenship competence.

**Thanks for participating
and for
sharing opinions and ideas!**



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