Role Reversal to Facilitate Social & Moral Compassion: A Case for Climate Change as an Ethics Dilemma

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Abstract

Supporting socioscientific decision-making skills in science classrooms is vital to the education of scientifically literate citizens. Character and values play a key role in accomplishing this fundamental goal of science education. However, students’ decisions about complex socioscientific issues often lack social and moral compassion. In this study, we advocate for the use of role reversal to facilitate such compassion. We illustrate our proposal by providing a lesson plan on the construction of hydroelectric power plants to reduce carbon emissions and fight climate change.

Keywords: decision making; social and moral compassion; role reversal; climate change.

Introduction

Perhaps more dramatically than ever before, the COVID-19 pandemic has shown us how individual decisions can have global consequences. Educating students in scientific literacy so that they can engage in well-informed decision-making processes is not only important for individual well-being but also for global public health. Therefore, science education in the 21st century focuses not only on encouraging students to have positive attitudes toward and interest in science but also on developing their character and values so that they “act responsibly with respect to human life and compassion for other human beings throughout the globe. This belief system serves as a driving force for individuals to act responsibly as citizens of technologically and scientifically advanced 21st century society” (Choi et al., 2011, p. 681).

Socioscientific issue (SSI) based teaching can engage students in decision making processes through evidence-based discourse, which is a requisite for a scientifically literate citizenry (Zeidler et al., 2019). SSI-based teaching, which focuses on using ill-structured and open-ended problems, requires students to consider their moral and ethical responsibility for these difficult decisions. In this process, character and values serve as core guidelines for decision making and responsible action in relation to global SSIs (Lee et al., 2013; Choi et al., 2011; Herman et al., 2020).

As SSIs lack clear solutions, they help equip students with the skills needed to consider multiple perspectives on an issue and to develop empathy for others (Powell et al., 2021). To educate students as democratic citizens in the 21st century, and hence to foster scientific literacy, Choi and colleagues (2011) suggest that students ought to develop the following values and character traits: an ecological worldview (a belief that human lives and the environment form a single, bounded system); a commitment to socioscientific accountability (i.e., to taking sociopolitical actions to solve complex problems); and social and moral compassion (feelings of empathy and compassion for others).

Research on students’ character and values in the context of SSI-based teaching and learning largely focuses on university students (Kim et al., 2020; Uzel, 2020), with less attention paid to school-age students. These studies show different results regarding character and values. For instance, Gao and colleagues (2019) developed and implemented an emotional competence SSI program with 26 tenth-grade students. They used coltan mining and gene editing technology as SSI contexts and found no statistically significant difference in empathetic concern. Similarly, in a more recent study, Powell and colleagues (2021) investigated the character and values of 77 seventh-grade students in relation to animal cloning. The students were engaged in whole-group discussion, reading, and argumentation tasks. The quantitative results showed that even after instruction, the seventh-grade students’ empathetic concern about animal cloning was not significantly improved.

Dramatic techniques have long been used to teach socioscientific decision making. Studies have focused on role-play scenarios that give students opportunities to access different perspectives on dilemmatic situations (Agell et al., 2015; Belova et al., 2015; Simonneaux, 2001; Lee et al., 2020). The psychodramatic technique of role reversal uses the exchange of roles to encourage each side to understand their counterparts’ views and feelings (Yaniv, 2012). Although it does not ensure a full understanding of the other, role reversal provides a space for exploration of and identification with opponent’s feelings, attitudes, and experiences (Kellerman, 1994). Role reversal is therefore a tool for considering alternative arguments (Zeidler & Nichols, 2009) and for considering the emotional dimensions of an issue as experienced by the other. However, our
understanding and practical knowledge of role reversal is limited because only a small number of studies have examined its use to explore socioscientific issues in biology classrooms (e.g., Walker & Zeidler, 2007). In this paper we defend the value of role reversal as a dramatic technique that facilitates social and moral compassion in high school students, focusing specifically on empathetic concerns relating to hydroelectric power in the context of climate change.

### Instructional Sequence Following the SEE-SEP Model

We chose the topic of climate change as a focus for bioethics education because of its direct relevance to health, values, and individual responsibility and its global consequences (Cox Macpherson, 2013). We chose the specific topic of adopting hydroelectric energy as an alternative energy source in order to reduce fossil fuel use and thus mitigate climate change. The Turkish eighth-grade standard addressed is “F.8.6.3.3. Discusses the causes and possible consequences of global climate changes. (a) Explains greenhouse effect. (b) In the context of global climate change, it is questioned how environmental problems can affect the future of the world and human life.” (Ministry of National Education, 2018).

This unit is based on the SEE-SEP model suggested by Chang-Rundgren and Rundgren (2010). The model advocates holistic teaching of SSIs by incorporating six subject areas (sociology/culture, economics, environment/ecology, science, ethics/morality, policy—hence SEE-SEP) grounded in the three associated aspects of values, personal experiences, and knowledge. They further argue that these aspects are integrated with the subject areas. This framework can help students to formulate a holistic view of a given SSI by considering different aspects of the issue, which can, in turn, enhance students’ informal reasoning and decision making. Next, we explain a five-step instructional sequence prepared for engaging students in socioscientific decision making and facilitating students’ social and moral compassion.

#### Step 1. Knowledge Organization

First, give the following short explanation to students and ask them to answer the following question, in order to identify their positions on hydroelectric energy. “On a scale of 0–5 (where 0 is strongly disagree and 5 is strongly agree), explain to what extent you support the construction of a new hydroelectric power plant in our town to fight climate change?” Ask students to individually note their initial ideas and remind them to fill out Table 2 as they progress in the activity. Then, put the students into six groups according to their responses. In order to expose students to different views and counterarguments, make sure to group students with opposing views as much as possible. To initiate students’ thinking about the issue, give students 10 minutes to discuss the issue in their small groups.

#### Step 2. Preparation for Role Play

Give each student a role associated with one of the six subject areas in the SEE-SEP model (Table 1). Assign three students in the groups to argue against and three to argue for the construction of a hydroelectric power plant. During this step, assign students to opposing positions based on their rankings in step 1. For example if the student chose 0, indicating that they strongly disagree with the power plant construction, assign them a role that advocates for the construction. Remind students that they will be participating in a

| Sociology/Culture—Local Resident | Environment/Ecology—Environmental Activist | Ethics/Morality—Ethics Professor |
|---------------------------------|------------------------------------------|---------------------------------|
| You are a local resident and are concerned that the construction of the power plant may threaten an endangered species in the region. You are also concerned about the impact of the power plant on the local tea farming industry. You believe that tea farming has cultural importance, as your family has been farming tea for four generations and come together every summer for harvesting. | You are an environmental activist who opposes the construction of the power plant because it will reduce the water in local stream beds. This will harm amphibians living in these streams and hasten the extinction of endangered species such as red-spotted trout. | You are an ethics professor. You argue that the consumption rate of goods is increasing in industrialized countries. This increases the carbon footprint of producing and delivering these goods. Building more power plants will increase industrialization and decrease the cost of goods, so that people will consume more and energy demand will rise further. This will, in turn, increase the carbon footprint even more. |

| Economy—Tea Farmer | Science—Physics Professor | Policy—Policy Maker |
|--------------------|----------------------------|---------------------|
| You are a tea farmer in the area, and you only work during the months of April, June, August, and mid-September. Due to climate change, Rize has received less precipitation, and tea was harvested only three times this year. You fear that in the near future the region will become less and less suitable for tea cultivating. You support the construction of the power plant as it will create job opportunities, as well as provide cheap energy. | You are a physics professor at a university. You have evaluated different types of power plants and support the construction of the hydroelectric power plant on the grounds that it will provide clean energy and reduce carbon emissions. | You are a policymaker in the department of energy. You support the construction of the power plant, as it will provide cheap energy that will contribute to economic growth. As a signatory of the Paris Agreement to reduce carbon emissions, constructing the plant will help foster a positive image of the country in the international political arena. |
fictional TV panel. Tell students to construct their arguments based mainly on the subject area assigned to them. The teacher acts as the moderator of the TV show. If some groups have fewer than six students, more than one role can be assigned to each student. There will thus be two groups with different positions. Here is a sample scenario followed by role cards designed for the six subject areas suggested in the SEE-SEP model.

**Scenario:** Rize, a city located in northeast Turkey, has a humid subtropical climate, which makes it suitable for tea farming. The region receives high levels of precipitation and is rich in water sources. The government has recently begun to increase the number of hydroelectric power plants to meet demand for energy and fight against climate change. A new power plant construction is to begin in Ikizdere province, and there will be a televised debate about the construction on a local channel.

Ask students to search on the internet for relevant information about their assigned subject area. Make sure that students identify the source, writer, and date of publication of the information they use. After they finish their initial search, ask students to write down their values, experiences, and what they know about the subject and to formulate a position on the issue from the perspective of their assigned role (Table 2).

**Step 3. Role Play**
Remind students that they should add more information to their role cards based on their research. Then, engage each group in improvisation. When each group performs, remind students in the other groups to write down the overall argument and the main points of the performing group’s arguments. The teacher acts as a facilitator of the debate. Begin by asking students to present their claims and evidence, including information about their values and personal experiences. Then challenge students’ ideas through the counterarguments put forward by the other students in the group.

**Step 4. Role Reversal**
After the role play finishes, students switch roles and pass their role cards to group members who have an opposing role. Give the groups about 15 minutes to prepare. This will give students a chance to consider their opponents’ point of view, including their knowledge, values, and experiences. Later, repeat the fictional TV show with the roles reversed. When the role reversal finishes, ask students to write down how they feel about the opposing role’s values and experiences (Table 2). Furthermore, ask them to explain whether their views about the construction of the power plant have changed.

**Step 5. Whole-Class Discussion**
When the role plays finish, ask students to summarize the arguments in writing, incorporating evidence that both supports and counters their own positions about the proposed construction of a hydroelectric power plant to mitigate climate change (Table 2). Initiating a whole-class discussion, the teacher challenges students to consider alternatives and specifically encourage students to formulate answers that take into account other people’s values, experiences, and feelings. Finally, ask students how this issue will affect humans globally. The teacher also reminds students that ongoing inquiry is essential to SSIs and that there are no definitive solutions to such complex issues.

| My Initial Ideas about the Hydroelectric Energy Subject | My assigned subject area role (mark one) |
|-------------------------------------------------------|----------------------------------------|
| o My initial position (mark one):                      | o Sociology/culture                    |
| o For                                                  | o Economy                               |
| o Against                                              | o Environment/ecology                   |
|                                                       | o Science                               |
|                                                       | o Ethics/morality                       |
|                                                       | o Policy                                |

| Knowledge (What does current scientific research tell us about the role of hydroelectric energy in the fight against climate change?) | Values (What type of societal values and personal attitudes one could have regarding the issue?) | Personal Experience (What type of experience one could have regarding the issue?) |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| What could be the overall argument for my role?                                                                 | Has my initial claim changed after the role reversal? Explain why or why not.                   | Considering the perspective of both roles, what do I now think about the hydroelectric power plant construction regarding my assigned subject area? |
| What was the main argument I presented when I reversed my role?                                                                 |                                                                                               |                                                                                  |
| How do I feel about my reversed role’s values and experiences regarding the issue?                                                                 |                                                                                               |                                                                                  |
| What will be the global effect of constructing this hydroelectric power plant?                                                                 |                                                                                               |                                                                                  |
| My conclusion and final argument about whether or not to build the hydroelectric power plant:                                                                 |                                                                                               |                                                                                  |
○ Conclusion

In the context of socioscientific decision making, existing practices usually follow a sequence where teachers assign roles to students and organize a debate and a whole-class discussion, without actually exposing students to opposing views. The current lesson is novel as it assigns students to opposing roles and follows explicitly the SEE-SEP model for students to form a holistic view about the issue by considering different aspects. In this activity we chose the topic of renewable energy and, specifically, hydroelectric power. The type of energy and the roles can be revised based on the local context. This activity provides a space for students to formulate high-quality arguments by incorporating counterarguments and rebuttals into their reasoning. To increase the quality of the arguments put forward by the students, different computerized argumentation scripts can be used to make sure students use rebuttals and counterarguments before they engage in role playing. Furthermore, to use this lesson plan at the high school level, roles could be written by the students, which makes them reflect on their ideas and knowledge about the subject. This type of lesson plan sequence creates opportunities for students to see others’ points of view and thus develop empathy and sympathy for others, which is an important aspect of social and moral compassion. Students thus not only engage in evidence-based argumentation but also develop their character and values as 21st-century global citizens participating in socioscientific decision making.

References

Agell, L., Soria, V. & Carrio, M. (2015). Using role play to debate animal testing. Journal of Biological Education, 49(3): 309–21. https://doi.org/10.1080/0219266.2014.943788.

Belova, N., Feierabend, T. & Eikls, I. (2015). The evaluation of role-playing in the context of teaching climate change. International Journal of Science and Mathematics Education, 13, 165–90.

Chang-Rundgren, S.N. & Rundgren, C.-J. (2010). SEE-SEP: From a separate to a holistic view of socioscientific issues. Asia-Pacific Forum on Science Learning and Teaching, 11(1), Article 2.

Choi, K., Lee, H., Shin, N., Kim, S.W. & Krajcik, J. (2011). Re-conceptualization of scientific literacy in South Korea for the 21st century. Journal of Research in Science Teaching, 48(6), 670–97. https://doi.org/10.1002/tea.20174.

Cox Macpherson, C. (2013). Climate change is a bioethics problem. Bioethics, 27(6), 305–8. https://doi.org/10.1111/bioe.12029.

Gao, L., Mun, K. & Kim, S.W. 2019. Using socioscientific issues to enhance students’ emotional competence. Research in Science Education. https://doi.org/10.1007/s11165-019-09873-1.

Herman, B.C., Zeidler, D.L. & Newton, M. (2020). Students’ emotive reasoning through place-based environmental socioscientific issues. Research in Science Education, 50(5), 2081–109. https://doi.org/10.1007/s11165-018-9764-1.

Kellerman, P. 1994. Role reversal in psychodrama. In P. Holmes, M. Karp & M. Watson (Eds.), Psychodrama since Moreno (pp. 187–201). Routledge.

Kim, G., Ko, Y. & Lee, H. (2020). The effects of community-based socioscientific issues program (SSI-COMM) on promoting students’ sense of place and character as citizens. International Journal of Science and Mathematics Education, 18(3), 399–418. https://doi.org/10.1007/s11673-019-09976-1.

Lee, H., Yoo, J., Choi, K., Kim, S.W., Krajcik, J., et al. (2013). Socioscientific issues as a vehicle for promoting character and values for global citizens. International Journal of Science Education, 35(12), 2079–113. https://doi.org/10.1080/09500693.2012.749546.

Lee, Hyunok, Lee, Hyunju & Zeidler, D.L. (2020). Examining tensions in the socioscientific issues classroom: Students’ border crossings into a new culture of science. Journal of Research in Science Teaching, 57(5), 672–94. https://doi.org/10.1002/tea.21600.

Powell, W.A., Newton, M.H. & Zeidler, D.L. 2021. Impact of socioscientific issues on middle school students’ character and values for global citizenship. In Wardell A. Powell (Ed.), Socioscientific Issues-Based Instruction for Scientific Literacy Development (pp. 56–91). https://doi.org/10.1017/978-1-7998-4558-4.1ch003.

Simonneaux, L. (2001). Role-play or debate to promote students’ argumentation and justification on an issue in animal transgenesis. International Journal of Science Education, 23(9), 903–27. https://doi.org/10.1080/095006901011601676.

Uzel, N. (2020). Impact of a SSI program on prospective teachers’ character and values for global citizens. International Journal of Progressive Education, 16(5), 1–16. https://doi.org/10.29329/ijpe.2020.2771.

Walker, K.A. & Zeidler, D.L. 2007. Promoting discourse about socioscientific issues through scaffolded inquiry. International Journal of Science Education, 29(11), 1387–410. https://doi.org/10.1080/09500690601068095.

Yaniv, D. (2012). Dynamics of creativity and empathy in role reversal: Contributions from neuroscience. Review of General Psychology, 16(1), 70–77. https://doi.org/10.1037/a0026580.

Zeidler, D.L., Benjamin C.H. & Sadler, T.D. 2019. New directions in socioscientific issues research. Disciplinary and Interdisciplinary Science Education Research, 1(1), 1–9. https://doi.org/10.1186/s43031-019-0008-7.

Zeidler, D.L. & Nichols, B.H. (2009). Socioscientific issues: Theory and practice. Journal of Elementary Science Education, 21(2), 49–58. https://doi.org/10.1007/BF03173684.

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