

Researchers – teachers’ interaction in a collaborative design for promoting argumentation skills in a Socio-scientific issue

Abstract

The present study examines the challenges faced in the process of collaboration between researchers and teachers in designing a learning environment for promoting 11th graders argumentation skills in the socio-scientific topic of Global Warming. Results are based on 8 meetings of interaction. Discrepancies between students and researchers were mainly centered around the design of the activities. Teachers were concerned about having students engaged in a series of less-structured discussions with limited teacher’s guidance. Differences in experience and epistemological beliefs between researchers and teachers are proposed as the causes for the discrepancies observed. Not all teachers value inquiry and evaluation of theories and evidence as a way of knowing. The educational significance of the findings is discussed.

Aim

The present study examines the process of collaboration between researchers and teachers in designing a learning environment in a socio-scientific topic. Collaborative design has the advantage of ensuring teachers’ commitment and therefore reduces the possibility of adaptation during the implementation of the program (Reiser et al., 2000; Kensing & Blomberg, 1998). In addition, interventions based on collaborative design have a greater impact on students since the intervention won’t terminate as soon as the researcher leaves the classroom. Despite the significance of collaborative design, examples of such collaboration are scant and our understanding of how it works is at best speculative. Our aim in the present study is to identify challenges that researchers and/or teachers face through their collaboration in designing a learning environment. In particular, we are interested in identifying the issues of discrepancy, understanding the causes that lead to discrepancies and examining how discrepancies can be effectively solved.

We study the process of collaboration through the development of a learning environment which intends to promote 11th grade students argumentation skills and conceptual understanding in the topic of Global Warming. Research points out to the necessity of introducing argumentation in the science classroom since argument is central to the process by which science advances (Duschl & Osborne, 2002; Kuhn, 1993; Driver, Newton, & Osborne, 2000). But, what challenges researchers face when collaborating with teachers in designing a learning curriculum to promote argument skills in the science classrooms?

Methodology

In our study three researchers and five teachers collaborated. A science education university professor, a postdoctoral researcher and a masters’ student participated as researchers. The teachers were three primary school teachers and two higher school biology teachers. All teachers had masters’ degrees in science education.

We started having bi-weekly meetings and ended-up with weekly meetings. Up to this point we had eight 2-hour meetings. Group members had always something to prepare before each meeting. Within the first month a teacher dropped out of the group, because he couldn’t

attend the group meetings. The meetings usually started with a presentation by either a researcher/s or teacher/s and then the majority of the time was spent in lively discussions. In the first meeting the research objectives of the study were discussed. In the second meeting the learning objectives were discussed, an issue that was also revisited in the 8th meeting. The third meeting was about the scenario, finding the driving question and the design. The remaining meetings were about studying different aspects of the “Global Warming”.

During the meetings the researchers were taking notes and videotaped the meetings. The data were analyzed qualitatively. Reviewing our notes and videotapes we identified cases of discrepancies and examined the issue of the discrepancy and the process by which they were resolved or not. Comparing cases of discrepancies we tried to understand the causes that lead to the discrepancies.

Findings

Examination of the process of collaboration between researchers and teachers revealed many challenges. First, there were some practical difficulties. We experienced difficulty in finding a convenient time for our meetings; we ended up arranging meetings during the weekends, where people have a greater availability.

Second, there were many disagreements during the meetings. Disagreements were the norm rather than extreme cases. The issues of discrepancy were mostly about the design. Researchers proposed having students discussed the two alternative theories of Global warming: manmade or natural phenomenon, with the objective to offer students the opportunity to learn about contrasting theories and study plethora of evidence in order to promote students’ critical thinking skills and epistemological understanding. Teachers had difficulty in understanding what was the point of having some students supporting the theory of Global warming as a natural phenomenon since first, they themselves didn’t agree with this position and second they considered that this would be against the objective of developing environmental attitudes. Even after our 8th meeting one teacher still couldn’t see the point of this activity.

Another issue of discrepancy was the role of teacher, with teachers preferring to have a more leading role than the one researchers would like them to have. Researchers would like the learning environment to be based on a series of discussions between students, with teacher having a minimal facilitating role. Teachers on the other hand were worried that without guidance the learning objectives will not be reached.

Discrepancies were solved through discussions, which were not always conclusive.

Discussion

The present study identifies challenges that exist in the process of collaboration between teachers and researchers in designing a learning environment regarding a socio-scientific topic. But, what are the causes of these discrepancies? In our point of view disagreements are rooted in difference in attitudes and epistemological beliefs. Not all teachers value inquiry and evaluation of theories and evidence as a way of knowing. In addition, teachers show trust to their long teaching experience and exhibit some resistance in trying new approaches that take the control of the classroom away of them. Yet, we have to mention that after eight meetings of interaction and discussion most discrepancies were solved and our collaboration improved notably.

The present findings are of particular educational significance. Identifying the challenges faced during collaborative design involving teachers and researchers is the first step towards



bridging the gap between the two sides and maximize the fruits of their collaboration – fruits that could not be reached by having either researchers or teachers working alone.

References

- Driver, R., Newton, P., & Osborne, J. (2000). Establishing the norms of scientific argumentation in classrooms. *Science Education*, 84(3), 287-312.
- Duschl, R., & Osborne, J. (2002). Supporting and promoting argumentation discourse in science education. *Studies in Science Education*, 38, 39-72.
- Kensing, F., & Blomberg, J. (1998). Participatory design: Issues and concerns. *Computer supported cooperative work*, 7, 167-185.
- Kuhn, D. (1993). Science as argument: Implications for teaching and learning scientific thinking. *Science Education*, 77 (3), 319-337.
- Reiser, B. J., Spillane, J. P., Steinmuller, F., Sorsa, D., Carney, K., & Kyza, E. A. (2000). Investigating the mutual adaptation process in teachers' design of technology-infused