

Interplay between identity and agency in the context of physics education in Turkey: Case study.

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Abstract. This study investigates the interaction between identity and agency of physics teachers in Turkey from a sociocultural perspective. Data collection included individual semi-structured interviews, fieldnotes from classroom observations, informal interviews after observations, and lesson artifacts. Data analysis of the qualitative data was through thematic analysis to identify and code for recurring themes that illustrate the participants' views and practices. The results indicated the differences in two teachers' agency in terms of their beliefs, practices and social interaction with their colleagues and students. The study has implications for the preparation of pre-service and in-service physics teachers.

Introduction

Reform documents on national and international science education provide goals related to teacher knowledge, beliefs, and approaches to science teaching to enhance students' engagement in scientific practices including asking questions, making observations, planning and conducting experiments, data collection and analysis, communicating the results [1]. However, in a survey published in United States, Banilower et al. (2018) stated that science teachers at the elementary to high school levels rarely focus on student-centered education through the application of scientific knowledge [2]. A study on Turkish physics teachers also found that teachers tended to act as the source of the information; teachers' tendency to integrate project-based learning depended on their interest [3]. Although recommendations set goals for scientific inquiry and active learning, they also put challenges for the preparation, adaptation, and practices of science teachers. These situations guide teachers to develop teacher identity in a given context. Especially, novice teachers experience dilemmas and conflicts in modifying and adapting their knowledge and beliefs to practice, and we need to understand the construct of identity for novice teachers [4].

To address the recommendations of innovative reports, it is necessary to examine how teachers know themselves, learn, teach, and develop and how they imply their professional agency as a form of action. Avraamidou (2014) suggested that teacher education should focus more on teacher identity to study the learning and development of teachers beyond the knowledge, belief, and ability of teaching [5]. In this study, a sociocultural perspective was adopted to understand the interplay between teacher identity and teacher agency for two novice teachers in relation to their beliefs and practical work. The main research question was: How do two novice physics teachers' identity and agency interact after they start teaching?

Methods

The study had a multiple case design (Yin, 2014) to explore the interplay between two novice physics teachers' identity and agency in relation to suggestions for scientific inquiry. Two cases were selected in a one-year qualitative study since they were volunteer to provide their thoughts, concerns, and practices on the implementation of student-centered instruction at their school (purposeful sampling). All participants were informed about the research purposes of the study, they gave their written consent and ethics guidelines were kept. These cases were given pseudonyms: Oscar and Isabella. Both physics teachers graduated from a physics department and then received pedagogical certificate to become a teacher. Data collection included individual semi-structured interviews, fieldnotes from classroom observations, informal interviews after observations, and lesson artifacts. Semi-structured interviews included questions related to teachers' work: 1. What is your role as a teacher? 2. What does it

mean to be a physics teacher? 3. How do you plan your lessons? 4. How do you collaborate with other physics teachers? 5. How do you collaborate with teachers from other disciplines? Some questions were developed during the classroom observations. Data analysis of the qualitative data was through Braun and Clarke's (2006) [6] thematic analysis to identify and code for repeating patterns and themes that illustrate the participants' views and practices.

Findings and Conclusions

Oscar's and Isabella's agency for teaching through scientific inquiry were categorized in different ways. First, Oscar was enthusiastic about doing science experiments not only in his school context but also in out-of-school science contexts. Isabella was not confident and felt insufficient to do laboratory experiments in her school since she did not have enough time and resources. Second, Oscar believed that scientific inquiry and project-based instruction was possible in school settings, but he thought that physics teachers needed more support from physics professors to manage the design of school science laboratories. Oscar added that these environments could make students more active. However, Isabella focused on limitations of her work in her school setting, where students were using the laboratory as a library to solve physics problems or to read books. She focused on students' individual learning processes. Third, Oscar's teaching was in a traditional classroom to address students' needs for problem solving through interacting with them and encouraging them to explain their ideas; he was not able to enact his beliefs about scientific inquiry into his teaching. Isabella focused on direct instruction in parallel to her concerns for scientific inquiry; she solved physics problems on the board to address students' difficulties on mathematics. Fourth, in school community, Oscar recognized the capabilities of experienced teachers and considered them as mentors. For example, an experienced physics teacher in his school was very active in the enactment of scientific inquiry, and he emphasized that he was getting suggestions from him for his teaching. Isabella's school had four male physics teachers, and none of them tended to do laboratory activities. All physics teachers in her school were isolated to prepare students for the standardized testing. Fifth, Oscar recognized the value of scientific inquiry, so he prepared his own lecture notes to support students' scientific thinking. His teaching was active to motivate students to think and explain. Isabella emphasized the use of textbook and online physics materials for students' test preparation; her students were passive in her classroom. These results showed that Oscar believed in active scientific thinking and was confident and positive to grow, while Isabella was passive and isolated in her enactment. We can conclude that inquiry activities should be incorporated into in-service teacher education programs to help physics teachers experience reform-based learning and teaching practices.

References

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