Abstract
Models play a distinctive and irreplaceable role in scientific investigation and teaching. Because models are tools in understanding and learning about the physical world, it is important to give students an opportunity to create, reflect upon, and revise their own mental models. The purpose of this study was to determine how teachers scaffold students’ learning and how this scaffolding affects the students’ ability to construct a model of magnetism. In this study, the models of magnetism created by ninth grade students (47 students, average age 15 years, three teaching groups), were the indicators for learning supported by scaffolding. The research questions were: (1) What kind of changes can we see in the models students create? (2) How can the teacher use scaffolding to encourage the process of mental model building? (3) What kind of relationship can be seen between the models that the students create and the scaffolding that the teacher uses? The data were collected during a two-week learning session, designed at the University of Purdue. The teaching sequence contained six lessons, each of which was 45 minutes long. There were also pre- and posttests for students. During the lessons the students worked in groups of two or four. The students completed worksheets for each lesson. The models that the students presented in these worksheets were organized into six categories that were used to model a five-step category showing the students’ understanding of the phenomenon. Each lesson was video-recorded. Videos were analysed based on the system developed by Seidel. The findings show that the intervention has a positive effect on the understanding of magnetism. The models that the students use to describe magnetism were not stable during the learning process. Students needed scaffolding. Therefore, if a teacher uses several different types of scaffolding the students’ modeling process will be more successful. The teachers’ awareness of and sensitivity to the critical actions in ZPD help the students reach a more sophisticated model of the concepts of magnetism. It has been shown that it is difficult for students to conceive the details of different models without any help. Students need the teachers’ scaffolding and feedback to support their self-confidence. When the teacher provides knowledge in small quantities at a critical moment of learning, students benefit from this information in the most effective way. On the other hand, a lack of scaffolding affects the students’ modeling process negatively. Therefore, it is important that teachers have enough time to pay attention to the most important elements of their students’ modeling.