

Abstract

The Impact of Utilizing a Cognitive Struggle Strategy on Eight Graders' Conceptual Change and Achievement in the Topic of Waves and Sound

The purpose of this study was to investigate the effectiveness of cognitive conflict instruction strategy in comparison to the traditionally designed instruction to induce conceptual change in Waves and Sounds topic. The importance of this study stems from its trial to move from describing the alternative concepts to solve them utilizing a relevant cognitive conflict strategy.

The study was established to answer two main key questions; the first was whether there was a significant difference in conceptual change for students due to instruction strategy? While the second tried to provide an answer to whether there was a significant difference in students' achievement due to instruction strategy? The study adopted Hashweh's model of cognitive conflict (Hashweh, 1986) which was used as a general framework in trying to induce conceptual change via the cognitive conflict strategy Hashweh developed in 1986. To achieve this goal a quantitative methodology utilizing a quasi-experiment design was used and the sample was chosen in order to be represented, the students sampled were assigned in experimental group (143 students) and control group (736 students). Proper research instruments (including conceptual change/ cognitive struggle based activities, missions, alternative conceptions and achievement Test) were designed. Then the experimental group teachers were trained to conduct the activities which were developed to enhance cognitive conflict strategy. In parallel, the control group teachers taught their students without any external intervention. Science scores from the previous semester were used as a base line for comparison purposes. Results of the performance on the achievement test for the students in both the experimental and control groups revealed that the students in the experimental group scored significantly higher in both the conceptual change questions and achievement questions. Data analysis also showed that there were two main alternative conceptual frames contain all alternative concepts in sounds and waves one is about the Nature of Sound and its source, another is about waves

characteristics and how they affect each other, cognitive conflict instruction strategy improved students understanding of sounds and waves and was more effective to facilitate conceptual change than the traditional physics instruction. The study ended up with concrete recommendations for policy makers to focus more on raising clear public awareness of the effects of alternative conceptions which are carried by teachers on their teaching profession. Other recommendations were offered to the researchers in this field to carry out more studies that try to resolve the alternative conceptions in physics, and to study the effect of teachers' content knowledge on their potential to carry alternative conceptions in the topics they teach.