ABSTRACT

Engineering education is becoming increasingly popular in K-12 education. Massachusetts has recently adopted curriculum frameworks in technology and engineering, with a focus on the engineering design process. However, these new standards have created a need for professional development in this area, particularly among lower grade level teachers. The research presented in this thesis looks at twelve participants in a professional development workshop for teachers to learn about design projects using LEGO™ and ROBOLAB™ technology. The study aimed to answer the following questions for the Massachusetts inservice teachers, grades K-8, attending the workshop:

1. What kinds of concerns do these teachers have about engaging their students in open-ended engineering design projects?

2. What approaches do they take to solving open-ended engineering design problems presented during the professional development setting and how do they change with varied exposure to the model of the engineering design process provided by the Massachusetts Frameworks?

3. How do their self-reported confidence levels in their building, programming, and design skills change over the course of the workshop?

Participants were surveyed and videotaped during the workshop sessions. A video concept mapping technique was used to illustrate the design processes used by the participants. Three assertions were reached from the data gathered:
1. Administrative support, particularly in the form of professional development and classroom volunteers, is important for bringing engineering design problems to the classroom.

2. a) Teachers came from multiple perspectives entering the workshop, with some displaying a distinct preference for building or programming.
   
   b) For some of the teachers, it was difficult to accept the open-ended nature of the design problems because they do not have unique solutions and there is no correct answer.
   
   c) The teachers had a variety of natural design processes that were minimally affected with exposure to a model of the engineering design process. However, the teachers showed a greater comfort with generating multiple possible solutions after exposure to the design process model.

3. For these teachers, the workshop was a valuable experience that led to increased confidence in their use of the LEGO pieces and ROBOLAB tool set.