

## Purpose of This Study

To determine whether using technology with student-centered inquiry would enhance the development of middle schools students':

- Conceptual learning
- Mathematical self-efficacy

Using the principles of Universal Design for Learning as my curricular and pedagogical framework, I incorporated LEGO® Mindstorm Robots into student-centered inquiry projects designed to support students with EV3 design engineering projects in an effort to meaningfully merge science instruction with deliberate, content-specific mathematics instruction.

## Expected Outcomes

- Increase self-efficacy as evidenced by an increase in post-test scores.
- Compare and contrast strategies used to manipulate LEGO® Mindstorm EV3 Design Engineering Project Robots.
- Identify and implement lesson plans of manipulation to LEGO® Mindstorm EV3 Design Engineering Project based on observation notes.
- Evaluate student performance.

**Research Question:** What is the impact of using Lego® Mindstorm Robots on 7<sup>th</sup> grade students' mathematical self-efficacy?



**LEGO® Mindstorm EV3**

## Results

Average score increases from pre- to post- on a tool designed to measure self-efficacy in mathematics:

- ITEM 1: "I can solve most problems if I invest the necessary effort." **13.78% increase in affirmative responses from pre to post.**
- ITEM 2: "It's alright with me if I'm not the best at everything as long as I get to participate." Students reported a **10% increase in affirmative responses from pre to post**

## Study Design

- **Action Research Project:** Study conducted by a teacher, in part, to help her better understand how to improve her own practices (future "actions").
- **Length of Study:** Students were engaged with the LEGO® Mindstorm Robots daily for 40 minutes during Connections class over a 20-day period.
- **Data Collection:** Mixed Method Study
  - Pretest/Posttest to determine mathematical self-efficacy
  - Qualitative Data, including observations and student reflections.
- **Context/Subjects:**
  - Seventh grade middle school aged children.
  - Project Based Learning middle school.
  - 80 total participants.

## Works Cited

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