Legos in the Classroom

Measuring the Level of Student Engagement when Introducing Hands-on Programming Projects in a First Year Programming Course

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Objective

Determine the effect on student engagement with the introduction of hands-on assignments in the classroom.

Background

Ohio State University has had success engaging students in introductory programming courses by incorporating projects that manipulate physical components and read from sensors. (Toms & West, 2013)

Method

In order to measure engagement, data was collected throughout the Fall semester from 10 consenting students enrolled in Computer Science 200 (a first-year programming course for engineers involving the use of MatLab) at Penn State Wilkes-Barre through the administration of 3 online surveys and 2 in-person interviews.

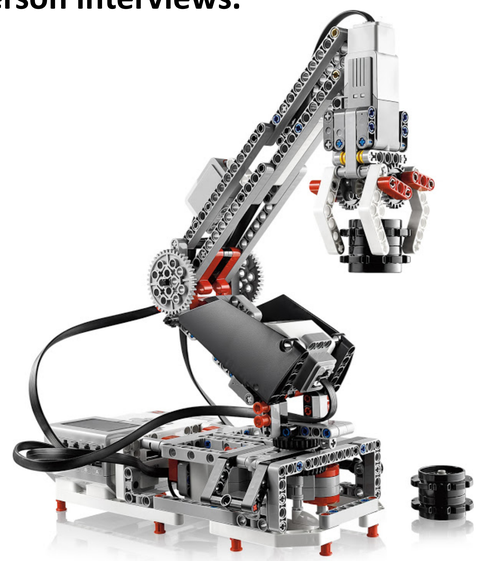
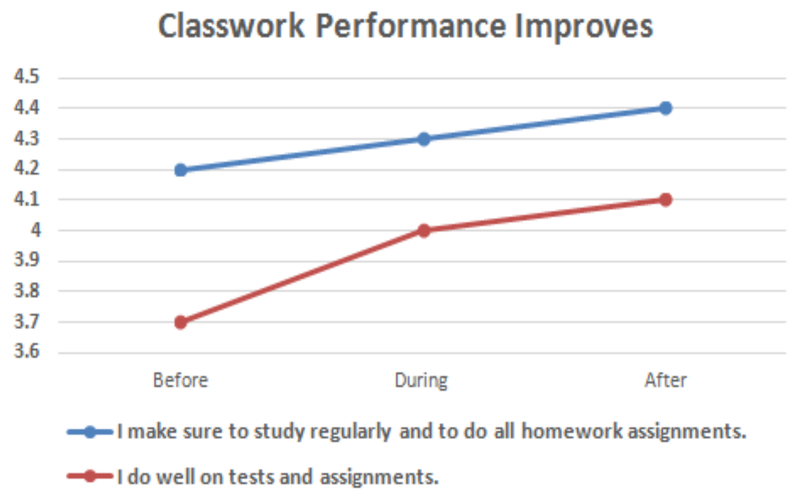


Figure 1. Lego MindStorm Built by Students

Data



Most Frequently Used Words – Interview 1

Most Frequently Used Words – Interview 2

Results

- Students exposed to hands-on projects in the classroom see an increase in engagement.
- Increased engagement leads to students becoming more likely to study and complete homework assignments.
- Exposure to hands-on projects sees an increase in students doing well on tests and assignments as a result of higher engagement levels.
- Hands-on assignments see students viewing class as "fun," good," and seeing themselves as "involved."

Conclusion

The introduction of hands-on assignments in the classroom improves student engagement by increasing student interest inside and outside of the classroom. Hands-on exercises are an effective tool for classroom learning.

Acknowledgements

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References

Template modified from: http://www.writing.engr.psu.edu posters.html

Toms, L., & West, D. (2013). "Adding Fun to First-Year Computer Programming Classes with MATLAB, Arduino Microcontrollers, and Model Trains."

Tsang, E., Gavan C., & Anderson, M. (2014). "The practical application of LEGO® MINDSTORMS® robotics kits: does it enhance undergraduate computing students' engagement in learning the Java programming language?"