EEGRC Poster: Using Super Heroes to Relay Biomechanics Principles in Education

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Ana is a PhD candidate and National Science Foundation Graduate Research Fellow in Mechanical Engineering at the University of Delaware. She received her Bachelor of Science degree in Biomedical Engineering at the University of California, Davis. Currently, she studies the mechanics and energetics of walking under varying gait intensities with the intent of contributing to the design and prescription of orthotic and prosthetic devices. Ana was awarded the Graduate Student Teaching Assistant Award in 2016 by her department and is a Teaching Assistant Fellow for the Center for Teaching and Assessment of Learning.

Dr. Jill Higginson, University of Delaware

Dr. Higginson is an Associate Professor in the Departments of Mechanical Engineering and Biomedical Engineering at the University of Delaware. The fundamental objective of her research group is to improve the understanding of muscle coordination for normal and pathological movements through coupled experimental and simulation studies. In recognition of her contributions, Dr. Higginson was awarded the College of Engineering Outstanding Junior Faculty Award in 2014 and the Excellence in Teaching Award in 2015.
Students (n = 16) worked in pairs to prepare the following educational materials to describe a biomechanics concept aimed for high school students:

1. Short educational video uploaded to YouTube® describing biomechanics concept and corresponding in-class learning activity.
2. Lesson Plan with step by step directions for completing corresponding in-class activity (i.e. worksheet, thought problem, demonstration) along with list of materials/costs.

Students were provided an example lesson plan and video based on the ASB K-12 Outreach Expo [2] (Figure 1), resources to video editing software, and a grading rubric (Figure 2). The instructor of record graded all projects based on the video and lesson plan submitted using the rubric. Overall, students showed creativity in applying the biomechanical concepts (Figure 3). The instructor of record addressed any misconceptions and errors in the students’ biomechanical analyses in a written comment with the grade. Despite varying projects, average total scores for the topic, video, lesson, time, analysis, and cost per the rubric were 9, 9, 9, 10, 9, and 10, respectively. The authors noted loss of points in the clarity of video category was most often due to unclear relevance of the biomechanics concepts to super heroes.

Figure 3 show example clips from student presentations.
Students also completed a peer evaluation based on the Oral Communication Valid Assessment of Learning in Undergraduate Education (VALUE) rubric from the Association of American Colleges and Universities (AACU) [4]. Figure 4 shows the adapted VALUE rubric which students completed for each presentation.

All groups received an average score of 4 from their peers in each category except for the “What’s in a Lever” group which received a 3 in Organization and Delivery with students commenting on the lack of clarity in the video. The authors noted that not all comments from students were reflected in the peer evaluation scoring. For example one student commented on “Is Elastigirl ‘Stretchier’ than a Rubber Band” that the “material seemed a little complicated for the target audience” but proceeded to give the group a 4 in Language. However, several students commented that the videos in general were “fun and engaging”, “great, fun, and interesting”, and a “good demonstration of the activity”.

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**REFERENCES**


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Intelligence is a privilege, and it needs to be used for the greater good of people.

*Doctor Octopus*