Geek Genes, Prior Knowledge, Stumbling Points and Learning Edge Momentum: Parts of the One Elephant?

Ahadi & Lister (2013)

Summary

This paper looks at the various hypotheses describing why grade distributions in a CS 1 course may be bimodal, including "geek genes" or prior knowledge and study skills, learning edge momentum, and stumbling points. The paper includes data from 4 tests given as part of a CS 1 course, giving the grade that students earned on the exam and providing some crosstabs showing relations between the grades earned by students on different exams.

The analysis provided shows that each hypothesis can be supported by looking at the data through that particular lens, and that all hypotheses could be reasonably shown to be correct. The purpose of this paper was to highlight this outcome and further the discussion of whether there is some other hypothesis or data that will help explain the whole picture.

Familiarity

High. I have read many papers in this area and have taught courses at the CS 1 level.

Strengths & Weaknesses

Strengths:

- This paper is written clearly and is easy to follow.
- The data is clearly described, and the actual test questions are included as an appendix.
- The authors present the raw data wherever possible, as well as their own analysis and interpretation of the data.
- Each hypothesis is addressed equally in the discussion.

Weaknesses:

- A few of the tests have a small number of questions, so the ability of the test to accurately discriminate student knowledge may be limited.
- The authors point out that the last two tests cover a different topic than the first two. While related in the fact that they both are in a programming course, there could be some disconnect between the two sets of tests.
- It is clear that the authors bring a particular viewpoint to this paper. Since it is a discussion paper this is fine, but worth noting.

Impact

The paper brings together a few different hypotheses for why CS 1 grades seem to be bimodal, which is a useful discussion to have. The data presented clearly supports each hypothesis, and the authors rightly point out that this is an issue that requires further analysis and study. I feel that this paper makes a valuable contribution to the field and may spur additional research.

Presentation/Grammar

No grammar/presentation issues found.

Audience

The paper is mostly targeted at CS education researchers who are looking at grade distributions in early CS classrooms, but may also be of value to CS 1 educators as they attempt to understand their courses and develop new tests that will help understand student learning and behaviors in that course.

Overall

Overall I recommend this paper. It provides a valuable overview of a particular concern in CS 1 classrooms, and provides ample information and discussion to help a reader understand it. Following the various citations in this paper will help readers get a broader understanding of the state of the field in CS education research related to CS 1.