A Fresh Look at Novice Programmers' Performance and Their Teachers' Expectations

Utting et al. (2013)

Summary

This paper analyzes the performance of computer science students in programming tasks, comparing the results to a prior study called MWG. It found that students performed better than in the original study, with two distinct groups emerging based on completion rates. The study suggests that performance was influenced by the amount of prior programming exposure, the provision of a test harness (which acted as a scaffold), the sequencing of learning activities, and the difficulty in writing tests. Interestingly, unlike in the original study where teachers were negatively surprised by student performance, in this study teachers' expectations were more aligned with the actual results. The paper emphasizes the importance of considering these factors in the design of programming education.

Familiarity

Moderate. I have read quite a few papers in this area.

Strengths & Weaknesses

Strengths:

• The paper is written in a clear and easily understandable manner.

• The data regarding the concept areas and score computations are explained clearly, and the actual test question for the skill assessment is provided in the appendix.

• The study implemented significant support for students, including the provision of skeleton code and a test harness to aid in the implementation of the program. Additionally, data on teachers' expectations were gathered.

• The study included a substantial and diverse number of participants in the cohort, ensuring a comprehensive representation.

Weaknesses:

- The study mentions the role of external resources such as online forums and documentation but does not thoroughly investigate how these resources affect student performance.
- The paper mentions teachers' expectations but it is not clear how these expectations were measured or compared to the actual performance.
- The study does not account for individual differences among students, such as their learning styles or personal motivations, which could potentially affect the outcomes. This limits the generalizability of the findings.

Research Papers

Motivation/Research Questions

Motivation is clearly stated and defined.

Prior & Related Work

The paper provides a thorough discussion of prior work, which is partially replicated in the experiment. It discusses the concepts, test assessments, and score computations in detail.

Scientific Approach

The scientific approach of this study appears suitable for addressing the research questions and analyzing the data. The utilization of the one-way ANOVA test and Tukey post-hoc test as data analysis methods adds rigor to the study. Additionally, the authors employed both quantitative and qualitative analysis techniques, to enhance the results of their findings.

Evidence

The evidence collected and the analysis done by the authors seems to answer the research questions and support their overall findings.

Impact

This paper provides valuable evidence of progress by partially replicating the original McCracken study and comparing the results. The analysis of the data indicates that students performed better on the programming task in this study compared to the previous one. Notably, the findings reveal the presence of two distinct populations within the overall cohort, showing a bi-modality in the outcomes at the method level. Furthermore, the study sheds light on teachers' expectations of their students' performance, suggesting that the teachers in this study had a better understanding of their students' capabilities. These new outcomes contribute to our understanding of student performance and teacher expectations in programming education.

Presentation/Grammar

No major issues found.

Audience

It is most useful for researchers, educators, and curriculum developers and individuals who are interested in understanding and improving student performance and conceptual understanding in programming courses. Educators can benefit from the insights and findings of the paper to enhance their teaching practices, align their expectations with students' abilities, and design effective assessments. Curriculum developers can use the information provided to make informed decisions about curriculum design, instructional strategies, and the incorporation of assessment instruments.

Overall

Overall I recommend this paper as it offers valuable insights into the evolving landscape of computer science education, taking into account the influence of technology, teaching methods, and students' prior knowledge. The study's use of a mixed-methods approach, combining quantitative and qualitative

techniques, enhances the validity and depth of the findings. The paper provides valuable information on student performance, conceptual understanding, and the effectiveness of instructional approaches. It serves as a valuable resource for educators and researchers aiming to enhance teaching practices and promote better student outcomes.