

Department Seminar

Students' engagement with argumentation in Mendelian genetics: Two-dimensional assessment of high-school students' answers to open questions

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Mentor:
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Feinberg building, Lab 3, Weizmann Institute of Science

Abstract

Argumentation is recognized as a core scientific practice, yet assessing students' written arguments remains a persistent challenge. My study explored the potential of large language models (LLMs) to evaluate students' scientific argumentation in the context of Mendelian genetics. Students' responses to a Mendelian genetics question requiring argumentation were analyzed with two objectives (1) to evaluate whether Hebrew NLP-based scoring models can accurately grade responses to a genetics question, and (2) to characterize patterns in student understanding and argumentation skills from their responses using cluster analysis. Building on Ariely et al. (2024)'s work with automated assessment, my study employed both fine-tuned Hebrew BERT models (DictaBERT) and few-shot prompting (ChatGPT-4o) to score 615 randomly selected open-ended responses from the Israeli Biology

matriculation exam. Results demonstrate that both automated approaches can reliably identify students' responses, offering promising pathways for formative feedback in science education. In addition to its methodological contribution, it revealed distinct patterns of argumentation within the context of Mendelian genetics through its two-dimensional assessment approach.