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Enhancing Biochemistry Assessment Quality in Medical Education Through Item Response Theory (IRT)

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ABSTRACT

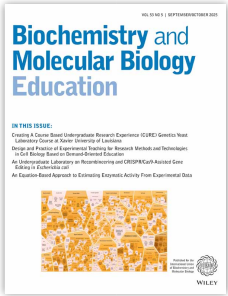
In medical education, particularly in biochemistry, crafting high-quality assessment questions is a primary challenge. Each item necessitates a thorough evaluation, for the identification of student abilities is crucial. This study aims to enhance assessment quality in biochemistry medical education by implementing Item Response Theory (IRT). This approach addresses Classical Test Theory (CTT) limitations, specializing in Multiple Choice Questions (MCQ). Recognizing the critical role of question quality in the learning process, the study investigates how IRT can more holistically and equitably assess student abilities. Employing a mixed-method research approach, this study combines comparative quantitative analysis with qualitative ICC curve analysis in the first exam to the second exam in presenting the theta (θ) value. It focuses on routine biochemistry exam data scores from medical students ($n = 89$). Significant improvements were observed in both question quality and student scores. Prior to IRT implementation, the average initial exam score was 56.1, which increased to 74.1 in the subsequent exam. The IRT evaluation indicated that the exam questions achieved a more effective differentiation between students of varying abilities. This improvement was evident from the increased person reliability and through Wright Map visualizations, which helped identify highly difficult questions via the Item Characteristic Curve (ICC). The study advocates for integrating IRT as a standard method in biochemistry and medical assessments and identifies the students' gaps in ability.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The full list of question items and additional examples of item modifications are available from the corresponding author upon reasonable request.



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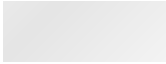
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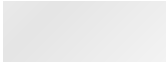
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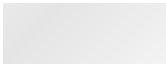
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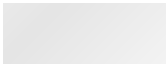
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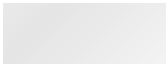
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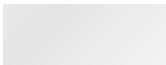
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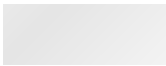
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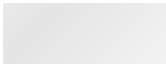
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