

Certainty-based marking: student behavior in multiple-choice exams

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ABSTRACT

Keywords – Certainty-based marking, student self-assessment, multiple-choice exam

Please indicate clearly the type of contribution you are submitting: ___ hands-on, ___ explore, X poster.

Background: In two engineering courses at 1st and 3rd semester, respectively, the summative assessment grading included a multiple-choice (MC) exam consisting of three time-separated parts through the course. The separation of MC exam parts additionally allowed for formative assessment. Correct and incorrect answers gave positive and negative points, respectively, with magnitudes such that random or guessed answers would approach zero points total. All questions had the answer possibility of “do not know”, which counted with zero points. This was a simple implementation of certainty-based marking (CBM) (Gardner-Medwin, 2006), (Adams & Ewen, 2009). The answer choice was intendedly influenced by self-assessed certainty, but also unintendedly by personality (Gardner-Medwin & Curtin, 2007). The aims of this study are to analyze existing test results and evaluate whether groups of students did not behave optimally in this decision-making, and to improve exam information and formative feedback between MC exam parts.

Explanation: The in-class activities consisted of theory and problem solving aligned with the assessment, and the MC exam parts assessed recently covered material. This continuously motivated student activity and learning during the course. Compared with traditional open-book exams, the MC exams had large numbers of questions ($n = 18$ and $n = 12$, respectively), and no solution strategies but only final answers were assessed, which was an argument for CBM. The students were instructed to carefully self-assess certainty when answering the questions. Practice MC quizzes were available for each lecture with questions spanning the intended learning outcome and training students for the exam method. Following each exam part, students received feedback on numbers of correct and wrong answers. Despite exam preparation and formative feedback, students may not have behaved optimally in the exams. Existing results form a large data set with many students and semesters. The 1st semester course ($n > 200$) covered more study lines, a subset of which included the 3rd semester course. Analysis of these data may identify problematic exam behavior, which improved exam information and formative feedback could prevent.

Set-up: Analysis of data from the two courses will be performed to address: 1) The use of “do not know” vs. wrong answer compared with final result (scatter-plots for visualization and relevant correlation and possibly cluster analyses); 2) Relationship between behavior on 1st semester and presence on 3rd semester; and 3) Comparison between study lines on 1st semester. The analysis may also address: 4) Comparison between behavior in the three exam parts in the 1st semester course and 5) Inter-semester results for same course.

Expected outcomes/results: The analysis will clarify whether students made best use of the answer possibilities in the MC exams or if particular groups of students did not. Based on the results, exam information and formative feedback will be improved accordingly in the future.

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