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Noha Nahari, Bryan Mac Donald, and Eabhnat Ní Fhloinn: Designing a mathematical diagnostic test using paired questions and certainty-based marking approach

In recent years, as a result of widespread concerns about the prior mathematical knowledge of entrants into universities and other third level institutions, mathematics diagnostic tests are often administered.. In order to gain more accurate information about student' prior mathematical knowledge and skills, studies are increasingly focusing on improving diagnostic tests and investigating new techniques for developing and assessing these tests. As part of our study testing the mathematical skills of incoming engineering students to Dublin City University (DCU), we tried a different approach to designing and assessing our diagnostic test. The aim of the study was to ascertain the optimum approach to measuring the incoming engineering students' strengths and weaknesses in basic areas of mathematics. For question-design, the test used a paired-question approach and consisted of pairing questions in different ways in order to minimise the likelihood of lucky guesses and allow us to identify slips while attempting to conclude the most efficient way of presenting questions in similar tests, considering limitations and time constraints surrounding test settings. Furthermore, a certainty-based marking (CBM) approach was used to allow students to reflect upon their uncertainties. This highlighted students' weaknesses and misconceptions as well as showing students' awareness of their lack of knowledge in some areas tested. This presentation will outline the study's findings and conclusions about the optimal way of designing a mathematical diagnostic test in order to gain the most information about students' mathematical knowledge and skills. Positives and drawbacks of each approach used in designing and assessing the test will be presented and discussed. In this presentation, we will also discuss how these approaches to designing and assessing a mathematics diagnostic test may result in richer and deeper information about students' knowledge..