EDITORIAL

FCI Leeds to Finland

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The commentary

The review paper on the force concept inventory (FCI) was written when I started my PhD project at the University of Leeds under Dr Philip Scott’s expert guidance (sadly, Dr Scott is no longer among us to co-author this commentary). My own teaching has been greatly influenced by the FCI; I still vividly remember the disappointment when I first administered the test to a group of students whom I expected to do very well. This experience made me change my teaching from a lecturing to an interactive-engagement type of instruction. The FCI provided a tool which helped in identifying problem areas in students’ understanding, and consequently in designing new approaches to address the difficulties. One such area was Newton’s third law. Interestingly, the remedy was inspired by an article published in Physics Education, and led to several publications. In addition, it changed the way one Finnish upper secondary school textbook introduced Newton’s third law.

It seems that our paper needs no major corrections in content. There is one thing, however, which should be rewritten in the light of new evidence. We wrote, based on the research existing at the time, that the average normalised gain is ‘practically independent of students’ initial scores’. This is no longer a valid conclusion since later studies have shown that individual students’ FCI pre-scores and normalised gains are sometimes correlated.

The FCI has inspired a lot of research in the physics education community. Advanced statistical methods (such as the Rasch analysis, item response theory, factor analysis, and differential item functioning) have been applied to pre- and post-test FCI scores in various introductory physics populations. Also, a new FCI-based conceptual test has been developed; the representational variant of the FCI (Nieminen et al 2010). One interesting line of study has addressed the gender neutrality of the FCI. There is strong evidence of a gender difference favouring males in total FCI scores and in normalised gains. It seems that these gender differences could be traced, at least to some extent, to the initial preparation in mathematics, physics, and scientific reasoning skills.

Of course, no single test should be used as the sole measure of success in a physics course, especially as conceptual understanding is only one objective in the physics curriculum. However, the FCI can be taken as a measure of minimum competence in the conceptual understanding of force. Keeping this in mind, the FCI is clearly a very useful tool for monitoring student learning.

Reference


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