

Testing student response systems

Peter Roberson

My motivation to conduct a study of the TurningPoint Student Response System was to see whether, given appropriate use, the Keypads might improve feedback both to me, and to students, on their progress.

In particular, to apply the technology as a mechanism for incorporating contemporary instructional strategies, while also reinforcing an underlying constructivist approach.

The goal was to allow for more student-centred, student-directed lessons, to provide much more instant feedback to students.

Two classes were selected for the study:

- ◆ A top, very able Year 9 class
- ◆ A bottom Year 7 class where many of the students have learning difficulties.

Keypads were generally used for four to six questions per lesson both at the start of a topic; to assess initial student topic knowledge, and to allow student input for the sequence of topics; and during the topic as formative assessment to analyse and inform student learning and gauge the relative effectiveness of various strategies. The Keypad assessment process also proved to be useful during lessons as a literacy tool to develop scientific language and clarify areas of misconception.

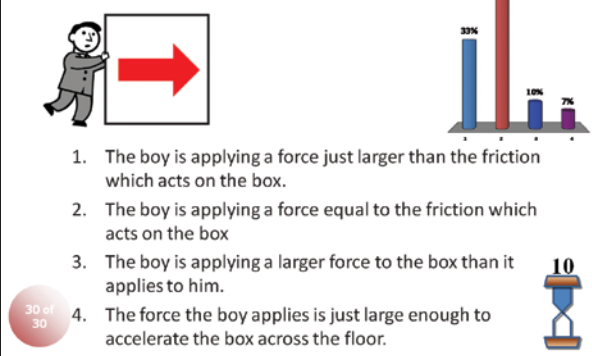
The Keypads were also used to gauge student reaction to their own learning, and their response to the use of Keypads.

The Keypads were not used directly as a tool for summative assessment, instead the school assessment program, involving pen and paper tests, filled this role. Typically, a Keypad question is one where I know from experience there are several common misconceptions.

For example the following question was asked after lessons on Newton's laws of motion:

A boy is just able to push a heavy box at a steady speed across a flat concrete floor. Considering the boy applies the force as shown (see insert), which of the following statements is correct?

A boy is just able to push a heavy box at a steady speed across a flat concrete floor. If the boy applies the force as shown, which is correct?



- 1 The boy is applying a force just larger than the friction which acts on the box.
- 2 The boy is applying a force equal to the friction which acts on the box.
- 3 The boy is applying a larger force to the box than it applies to him.
- 4 The force the boy applies is just large enough to accelerate the box across the floor.

The poll results were discussed in order to:

- 1 Highlight the need to be careful when reading a question to ensure that they noted all the important detail provided within the question, (exam technique).
- 2 Highlight Newton's laws to demonstrate how easily questions can be answered when time is taken to consider the physics involved.

The following discussion of the alternative answers is typical.

Answer 1

Is one of the most frequently chosen answers when not thought through by the student, or carelessly read. It is true to start the box moving the force must be greater than the friction *but* the question clearly states that the boy is already pushing the box at a *steady* speed, i.e. a constant velocity because the floor is flat (horizontal).

Answer 2

Is the correct answer as the situation described by the questions perfectly demonstrates Newton's first law, i.e. the forces must be balanced because the box is moving across the flat floor at a constant speed, therefore friction equals applied force.

Answer 3

Cannot be correct because Newton's third law says that there is always an *equal* reaction force to any applied force.

Answer 4

Makes no sense at all considering we are told the box moves a steady speed and, as such, it is *not* accelerating (changing velocity).

The ability to immediately discuss the reasons for the mistakes was noted as being very useful for a large number of the students.

Overall the response from nearly all students was very positive with a noted increase in individual participation and focus during lessons. The younger boys seemed to really enjoy using the Keypads and often the first thing said on arrival at class was "Are we using Keypads today?"

It was found that the anonymity the system provides was of real benefit in class and resulted in increased comfort levels in participation. The ability to discuss the reasons for their wrong choices and provide instant feedback was also considered of great benefit.

The ability to set up the Keypads so the responses from each student could be monitored, provided me with much information on the individual student's progress, clearly showing when the outcomes had been achieved, when particular students needed extra help, or when features of my own explanation and methods could be improved.

In conclusion the Keypad technology is well received by the students and has the potential to be an asset within the modern classroom.

The ability to provide instant feedback to students, combined with the ability to later analyse detail of individual student responses, is of great benefit in allowing the teacher to monitor progress and to take appropriate steps as needed. This can save a lot of time and, with careful preparation of the questions and the alternatives offered, can provide insight into the individual strengths and weaknesses within the class.

Keypad Interactive tel 1800 463 279
www.keypad.com



Peter Roberson is the author of popular school science texts in NSW. This study involved students at Shore School, North Sydney. He is on the STANSW Council and is interested in the appropriate incorporation of technology to enhance the learning experience. He is currently working for NSW Curriculum Directorate.

