Do students perform better at PAT M when there are no answers to choose from?

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Introduction

PATMaths is a thoroughly researched, Australian test designed to provide objective, norm-referenced information to teachers about the level of achievement attained by their students in the skills and understanding of Mathematics.

Large scale testing often uses multiple choice questions to test learners' understanding. Does this style inhibit students' thinking? Are they better off having no answers to choose from?

The research was designed to assess if children answer questions more accurately when there are no answers given to them as an option.

Figure 1

Method

Based on the work of the Empowering Local Learners project I looked at two ideas:

1 - students' feelings about multiple choice questions
2 - students' process to work out answers to Maths questions

Children were given twenty minutes to answer 4 different questions from the PATMaths test (Figure 1). These questions were the least accurately answerd from the whole of Year 1s and 2s at their school. Two questions had multiple choice answers and two questions were left with no answer choices.
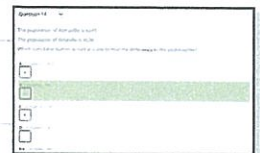
Observation

The results showed that 40% of Year 2s answered the 'non multiple choice' questions correctly, while only 28% answered multiple choice with a right answer. Year 1 data showed the reverse: 20% of these students answered the 'non multiple choice' questions correctly, however the multiple choice questions showed 52% accuracy.

The students were required to explain why they chose their answer for the multiple choice questions. Answers varied, however most students replied 'I just knew it', 'I thought it was that one' or 'I guessed it was right'. There were very limited responses as to the computation they used or the thinking required. The students who 'just knew it' or 'guessed' were more incorrect than those who put more thought into their reasons.

At the completion of the activity I asked the students two questions: 1—Who preferred the multiple choice type questions? 2—How were your anxiety levels when faced with each question type?

The class preferred the non-multiple type questions (7:13) however the ratio regarding anxiety showed that most students weren't anxious during either question type (4:7:9).

When asked to respond 'why' to their preference, students who preferred multiple choice questions thought that having answers provided actually helped understand the question more, or it helped work it out because the answers were clues.

Other students thought that having no answer clues makes you think more, you have to work it out by yourself and questioned if you're learning if the answers are there.

Discussion

Figure 2

My original thoughts about how students would approach the questions changed throughout the activity. The Year 1 group completed their multiple choice questions a lot quicker than the other questions and their results were very poor for multiple choice. Did they read the questions or skip to the answers and then skim the questions? One of the four questions had no Year 1 student answer it correctly, except when it was presented as a multiple choice (Figure 2). Further questioning to these students would give a clearer understanding about why this is so.

Students had perhaps focussed their attention on what was there and not what information may not have been provided This suggests that learning experiences that focus attention on the mathematical features of the problem and what information is perhaps irrelevant or missing would support further investigation.

My research is asking the question: Do students perform better when there are no answers to choose from? My answer to this is inconclusive, as only a limited number of students were given the questions. Of these students the results for Year 1 and Year 2 were different. To gain a more accurate result, the same questions would need to be given to the rest of the Year 1s and 2s at the school.