## Question:

Of what value would it be to analyse students ability to solve written Maths word problems with Newman's error of analysis steps prior to sitting a written Maths assessment such as 'NAPLAN' or 'PAT M'?

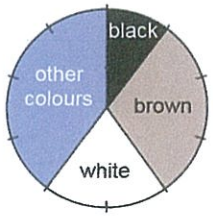
## Research:

The Australian educator Anne Newman (1977) suggested five significant prompts to help determine where errors may occur in students attempts to solve written problems.

Research using Newman's error analysis has shown that over 50% of errors occur before students get to use their process skills.

Here are the results for a survey on shoe colours.

**Shoe colours**




Decoding Errors:
results – rules, shoe, percentage, here- her, where
Comprehension Error: 'Which of these answers are white?'
Transforming/Processing Error:
Counting using the scale of 5%. Used the 3 lines and not the spaces therefore got the answer 30% Divided the whole white piece into 10 smaller pieces and therefore got 10%
Teaching point:
Knowledge on what a percentage is.

What percentage of shoes were white?

1. A: 2%
2. B: 10%
3. C: 20%
4. D: 25%
5. E: none of these

Here are what some students thought about their chances of swimming 200 metres in 5 minutes.

| | |
|---|---|
| Amalia | I am certain to be able to. |
| Noah | My chances are about 1 in 2. |
| Emily | I think I only have 1 chance in 10 of finishing on time |
| Jack | I haven't a hope. |
| Bruno | I have a 90% chance of doing it. |

Which student has his or her chance marked on this scale with an X?


1. A: Amalia
2. B: Noah
3. C: Emily
4. D: Jack
5. E: Bruno

Decoding Errors:
Here – where, her haven't – have, chances –changes, certain - continue, Amalia - adult
Comprehension Error: Could not put all the pieces together to restate., Go to the one with the lowest chance. therefore got 10%
Teaching point:
Slow down the thinking time so greater comprehension will take place.

A champion netball team scored 90, 89, 76 and 88 goals in 4 games.
For this number of games, the championship record was 309 goals.
By how many goals did the team break the record?

1. A: 14
2. B: 26
3. C: 34
4. D: 44
5. E: 46

Decoding Errors:
Needed to re-read as read too fast and made mistakes.
Transforming Error:
I am just going to look and guess. I think I made need to divide (When doing the process realised their mistake and subtracted.)
Processing Error: Adding large numbers..

Improve Results in Maths Word Problems.

## Method:

1. Select 3 PAT M questions. (As shown)
2. Select 3 students (1 with low reading score but reasonable math's ability, 1 with median reading ability and reasonable math's ability and 1 with good reading skills but lower math's abilities.
3. Conduct the error analysis interview

To conduct the error analysis, the teacher follows a series of interview cues to probe the student as they solve each word problem. Each cue relates directly to one of the five stages of the basic structure of solving word problems for mathematics.

*Interview cues*

- Please read the question to me. If you don't know a word, leave it out.
- Tell me what the question is asking you to do.
- Tell me how you are going to find the answer.
- Show me what to do to get the answer. 'Talk aloud' as you do it, so that I can understand how you are thinking.
- Now, write down your answer to the question. (Newman, 1983)

## Results:

- The student with the lowest PM Reading level could only read one of the 3 questions correctly and therefore only restated the questions correctly in 1 of the 3 word problems. However when the problem was read to the student they moved onto the process stage in 2 out of the 3 questions.
- The student with the median PM Reading level, read 2 of the 3 questions aloud and went onto restate them correctly. With the third question they had to re-read it again and though could restate it then had difficulty working out how to solve the problem initially. After some 'thinking time' did solve it correctly.
- The student with the highest PM Reading Level had no problem reading the questions aloud but only restated the questions correctly in 2 of the 3 questions. This student did not move pass the transforming stage in all questions.

## Discussion:

The results showed that it would be advantages to do the 'error analysis' prior to sitting a written Maths assessment especially for those students who have low reading ability. The results showed that the student who had the most trouble reading the questions would have performed better if each question were read aloud to them. It also points out future teaching points for particular students.

Further Question: What is the best way to improve student's reading comprehension in Maths?