Thinking and learning in junior high school: an evaluation of some enhancement strategies

Grahame William Wagener
University of Wollongong


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THINKING AND LEARNING IN JUNIOR HIGH SCHOOL:
AN EVALUATION OF SOME ENHANCEMENT STRATEGIES.

A Thesis submitted in partial fulfilment of the requirements for the
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Grahame William Wagener
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CHAPTER TEN

ANALYSIS OF QUESTIONNAIRE AND INTERVIEW DATA

The questionnaire and interview data relating to research questions 2 and 3 and the related propositions and hypotheses are discussed in this Chapter.

10.0 Questionnaire

One hundred and sixty one students anonymously completed the questionnaire on metacognition of whom 74 were CoRT-1 students. The data were analysed using chi-square procedures available in the SPSS (1995) computer software package. Table 17 gives the percentage of each item within each question on CoRT-1 for the treatment students. The students were asked to rank their responses according to a Likert scale of 5 (all the time), 4 (most of the time), 3 (half of the time), 2 (some of the time) and 1 (not at all).
Table 17

The percentage of each item within each question on

CoRT-1 for the treatment students. (N=74)

<table>
<thead>
<tr>
<th>Questions on CoRT-1</th>
<th>Likert -Scale</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Thinking tools, such as CAF and PMI, make it easier for me to think about the work that I am doing.</td>
<td>8.1</td>
<td>20.3</td>
<td>27</td>
<td>21.6</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>2. Thinking tools, like CAF and PMI, have made it easier for me to learn.</td>
<td>9.5</td>
<td>13.5</td>
<td>23</td>
<td>25.7</td>
<td>28.4</td>
<td></td>
</tr>
<tr>
<td>5. I use thinking tools, such as CAF and PMI ...</td>
<td>5.4</td>
<td>9.5</td>
<td>32.4</td>
<td>25.7</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>7. I believe that using thinking tools, such as CAF and PMI, will help me to learn.</td>
<td>17.6</td>
<td>20.3</td>
<td>18.9</td>
<td>25.7</td>
<td>17.6</td>
<td></td>
</tr>
<tr>
<td>8. I believe that using thinking tools, such as CAF and PMI, will help me to think.</td>
<td>9.5</td>
<td>21.6</td>
<td>18.9</td>
<td>33.8</td>
<td>16.2</td>
<td></td>
</tr>
</tbody>
</table>

The response rate to the treatment student questionnaire was 100%.

Above is a summary of the responses received to the five CoRT-1 related questions. The results are reported as percentages of students choosing responses that relate to the questionnaire scale ratings of half and/or more than half of the time. The questions offered an opportunity for students to respond that the strategies were of no use, and consequently number 1 would be chosen. Student responses numbers 3 to 5 were selected by the researcher as being positive on a conservative basis.

For Question 1, 55.4% of the treatment students responded that CoRT-1 strategies made it easier to think about the work that they were doing. For Question 2, 46% of the treatment students responded that CoRT-1
strategies have made it easier for them to learn. For Question 5, 47.3% of the treatment students responded that they use CoRT-1 strategies half and/or more than half of the time, according to an analysis of the questionnaire scale ratings. For Question 7, 56.8% of the treatment students responded that half and/or more that half of the time they believe that CoRT-1 strategies will help them to learn. For Question 8, 50% of the treatment students responded that for half and/or more than half of the time CoRT-1 strategies will help them to think. This analysis gives support to research hypotheses 5, 6, 7 and 8.

Table 18 gives the percentage of each item within each question on metacognition for all the students.

Table 18

The percentage of each item within each question on metacognition for all the students. (N=161)

<table>
<thead>
<tr>
<th>Questions on metacognition</th>
<th>Likert-Scale</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Learning about how the brain functions has made it easier for me to understand how I think.</td>
<td>5.3</td>
<td>22.2</td>
<td>30.1</td>
<td>21.7</td>
<td>20.7</td>
<td></td>
</tr>
<tr>
<td>4. Learning about how the brain functions has made it easier for me to understand how I learn.</td>
<td>8.1</td>
<td>16.3</td>
<td>26.6</td>
<td>24.2</td>
<td>24.8</td>
<td></td>
</tr>
<tr>
<td>6. I use knowledge about how the brain functions ... .</td>
<td>4.4</td>
<td>17.2</td>
<td>21.8</td>
<td>31.7</td>
<td>24.9</td>
<td></td>
</tr>
<tr>
<td>9. I believe that understanding how the brain functions will help me to learn.</td>
<td>7.4</td>
<td>11.7</td>
<td>26.5</td>
<td>24.1</td>
<td>30.3</td>
<td></td>
</tr>
<tr>
<td>10. I believe that understanding how the brain functions will help me to think.</td>
<td>8.1</td>
<td>19.4</td>
<td>20.6</td>
<td>20.5</td>
<td>31.4</td>
<td></td>
</tr>
</tbody>
</table>
The response rate for the student questionnaire on aspects of metacognition was 100%. Below is a summary of the responses received for the five questions on aspects of metacognition. The results are reported as percentages of students choosing responses, according to the Likert scale on the questionnaire, that relate to half and/or more than half of the time. For Question 3, 57.6% of the students responded that for half and/or more than half of the time learning about how the brain functions has made it easier to understand how they think. For Question 4, 48% of the students responded that learning about how the brain functions has made it easier for them to learn half and/or more than half of the time, while 43.4% of the students use knowledge about how the brain functions half and/or more than half of the time. For Question 9, 45.6% of the students responded that they believe understanding how the brain functions will help them to learn half and/or more than half of the time. For Question 10, 48.1% of the students responded that they believed that understanding how the brain functions will help them to think half and/or more than half of the time. This analysis gives support to research hypotheses 7 and 8.

A further analysis of the questionnaire data was conducted using chi-square procedures available in the SPSS computer software. Table 19 gives the chi-square likelihood ratio for each questionnaire item. Appendix G contains the complete analysis for each question.
Table 19
The Chi-square likelihood ratio for each Questionnaire item.

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Chi-square</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q. 1</td>
<td>1.88</td>
<td>0.75</td>
</tr>
<tr>
<td>Q. 2</td>
<td>4.99</td>
<td>0.29</td>
</tr>
<tr>
<td>Q. 3</td>
<td>1.51</td>
<td>0.82</td>
</tr>
<tr>
<td>Q. 4</td>
<td>0.84</td>
<td>0.93</td>
</tr>
<tr>
<td>Q. 5</td>
<td>2.88</td>
<td>0.60</td>
</tr>
<tr>
<td>Q. 6</td>
<td>3.00</td>
<td>0.56</td>
</tr>
<tr>
<td>Q. 7</td>
<td>3.73</td>
<td>0.44</td>
</tr>
<tr>
<td>Q. 8</td>
<td>3.46</td>
<td>0.49</td>
</tr>
<tr>
<td>Q. 9</td>
<td>2.49</td>
<td>0.64</td>
</tr>
<tr>
<td>Q. 10</td>
<td>1.44</td>
<td>0.83</td>
</tr>
</tbody>
</table>

The Chi-square likelihood ratio reveals that no item is significantly different.

Before examining the relationship of the questionnaire responses to the hypotheses, a summary of some of the students' questionnaire comments, which were voluntarily given in the space provided on the questionnaire, may add an additional insight. Appendix E contains the student questionnaire comments in detail.

When examining questionnaire and/or interview data the task, as Vialle (1991) points out, can be an overwhelming one for the researcher. This problem can be reduced by introducing a process of coding. A format suggested by Bogdan and Biklin (1992) involves several steps, namely:

Step 1. searching the data for regularities and patterns

Step 2. writing down words to represent patterns (p. 166).
This system allowed for the relatively easy retrieval of data from the comments (Bogdan & Bilken, 1992). The questionnaire and interview data were read over by the author several times to become familiar with the content and matching or similar key concepts were noted. This process allowed the researcher to classify comments as being positive and/or favourable towards the students' perception of the effect of the program on the students' attitude to learning and thinking.

Of the 74 treatment students the written responses on the questionnaire were small in number, namely: 11, 11, 4, 6, 4, and 4 for each question one through six. The small number of responses have not been given a great deal of weight because they were voluntary comments, on answer sheets with names on, and it is recognised that the student would most likely only make a positive comment, or leave the space blank.

However, the comments voluntarily made by students on the questionnaire do show some support for the questions (see Appendix E) and tend to fall in line with the students' circled Likert scale responses. For the treatment students it would appear that the students' comments have given additional support to Questions 1, 2, and 5, while Questions 7 and 8 the support is more limited. For all the students' responding to aspects of metacognition, there does appear to be support for Questions 3 and 4 while there is limited support for Questions 6, 9, and 10.
10.1 Interview - Treatment Students.

This Chapter now moves to a description and analysis of the interview data. As mentioned previously, of the 92 CoRT-1 treatment students 30 were randomly selected for an individual interview. Of the 184 students in the Year-Seven cohort, who were taught aspects of metacognition, 38 were randomly selected for an individual interview. Not all the interview data can be included here, so a random selection was carried out for inclusion. The complete transcripts of the randomly selected students' interview data are included in Appendix F. Ten student interview responses were randomly selected from the treatment group (N=30) and fourteen students interview responses were randomly selected from the interview of aspects of metacognition (N=38). All the interview responses have been used in the measure of whether or not the hypotheses can be supported. The coding procedure recommended by Bogdan and Bilkin (1992) was used to assist in an analysis of the interview data.

Interview Question 1. Has being taught thinking strategies, from the CoRT-1 program, helped you to think?

Fifty percent (see Appendix F and student responses 2, 3, 4, 9, and 10) of the randomly selected interview responses believed that the CoRT-1 program thinking skills strategies had helped them to think, while 20% of the
students believed that the strategies had helped sometimes, and 30% of the students believed that the strategies had not been of assistance.

Interview Question 2. Which of the CoRT-1 strategies can you recall? Why does this strategy stand out?

Sixty percent (student responses 1, 2, 3, 6, 8, and 9) of the students' responses mentioned two or more CoRT-1 strategies, 20% of the students were able to recall one of the strategies, while 20% of the students were not able to recall any of the strategies. Of those student responses that indicated ability to recall one or more of the strategies all indicated that the students were able to do so because of the ease by which the strategy could be remembered.

Interview Question 3. Has using CoRT-1 strategies, like CAF and PMI, helped you to learn?

Fifty percent (student responses 2, 3, 6, 9, and 10) of the students' responses believed that some of the CoRT-1 strategies had helped them to learn, 30% of the students believed they helped sometimes and 20% of the students did not believe that they helped at all.

Interview Question 4. Do you use any CoRT-1 strategies in the classroom? Which strategy? Which lesson(s)? Is there any particular reason for this?
Seventy percent (student responses 1, 2, 3, 4, 6, 8, and 10) of the students' responses stated that the CoRT-1 strategies were used across a variety of lessons because they were easy to remember and were useful in helping to solve problems and in divergent thinking. Ten percent of the students used the strategies sometimes and 20% of the students did not use the strategies at all.

Interview Question 5. Have you used any CoRT-1 strategy, in any situation, outside the classroom?

Thirty percent (student responses 1, 4, and 8) of the students' responses stated that CoRT-1 strategies had been used outside the classroom, 40% of the students used the strategies outside the classroom sometimes, while 30% of the students did not use the strategies outside the classroom at all.

Interview Question 6. Have the CoRT-1 strategies helped you? If so, why? If not, why not?

Eighty percent (responses 1, 2, 3, 4, 6, 8, 9, and 10) of the students' responses believed that the CoRT-1 strategies had helped them for a variety of reasons. Some of the responses mentioned higher marks, a greater variety of alternatives, or more ideas to use in creative writing or debating. Twenty percent of the responses did not believe the strategies had been of
any assistance. Most of these responses mentioned that the strategies had been forgotten soon after the completion of the program.

10.2 Interview - Aspects of Metacognition.

Fourteen interview responses have been in turn, randomly selected from the 38 students who were randomly selected for an interview. The complete transcript of the 14 interview responses is available in Appendix F. All 14 of the interview responses have been included in the analysis of whether the hypotheses can be supported. A coding procedure, as recommended by Bogdan and Bilkin (1992), has been used to assist an analysis of the interview data.

Interview Question 1. Has learning about how the brain functions helped you to learn?

Thirty-six percent (student responses 1, 3, 9, 12, and 14) of the chosen students' responses believed, for a variety of reasons, that learning about how the brain functions had helped them to learn. Fifty seven percent of the students' did not believe the knowledge gained had assisted them.

Interview Question 2. Has learning about how the brain functions helped you to think?
Seventy-one percent (responses 1, 2, 4, 5, 6, 7, 8, 9, 10, and 13) of the students' selected responses did not believe that learning about how the brain functions had helped them to think.

Interview Question 3. Do you think about your own preferred way of learning?

Seventy-eight and a half percent (responses 1, 2, 4, 5, 6, 7, 8, 10, 11, 13, and 14) of the chosen students' responses did not think about their own preferred way of learning.

Interview Question 4. Do you think that an understanding of how you learn will help you - in school? - out of school?

Seventy-one point four percent (responses 1, 2, 3, 4, 5, 6, 9, 11, 12, and 14) of the chosen students' responses believed that an understanding of how one learns will assist them in both school and out of school situations. This is quite interesting because on the one hand there are responses that indicate the students, generally, do not feel learning about aspects of metacognition has helped them to think and learn, yet on the other hand responses that indicate that students, generally, feel that this knowledge will be of assistance. This is a question deserving of further exploration as students mature through their years at school.
Interview Question 5. What do you think your preferred way of learning is?

Seventy-eight percent (responses 1, 2, 3, 6, 8, 9, 10, 11, 12, 13, and 14) of the chosen students' responses did not know what their preferred way of learning is. This is also a question that deserves further exploration, for if the research of writers in the field (Herrmann, 1988; de Bono, 1976, 1983; Edwards, 1995, 1996) are correct, then this knowledge can be of great assistance to students and should be introduced early in a student's educational career.

Interview Question 6. What is the difference between thinking and learning?

All of the chosen students' responses were able to give, in their own way and without judgement on the reasonableness of the statement, an opinion on the difference between thinking and learning. This is important because it reveals that the students are able to make some form of distinction and should be able to discriminate between the differences asked in the questions. To some extent the students' ability to give an opinion points towards some listening to, and thinking about, issues raised during the lessons on aspects of metacognition, and/or some thought having been given to thinking and learning at some time in their lives.
The interview data tend to support the hypotheses. There are some additional issues which must also be explored. The next section of this chapter will give a summary of the analysis of the questionnaire and interview data.

10.3 Summary of questionnaire and interview data analysis.

Each of the research hypotheses will be considered in the light of the analysis.

Hypothesis 5: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that CoRT-1 has assisted them with their in-class thinking.

An analysis of the data supports this hypothesis. In their responses to the questionnaire, their comments on the questionnaire and through interview the students generally judged that CoRT-1 had assisted them with their in-class thinking. In particular, the interview responses showed a reasonably positive responses to CoRT-1. This was especially noticed in the length of the responses as it would appear students, generally, had formed an opinion of CoRT-1 and were willing to express it. It is worth noting that this could be because the students were responding to what they believed the interviewer wanted to hear, but if this is the case it does not appear to be supported in an
analysis of the interview data, in relation to aspects of metacognition. As both groups were randomly selected from a fairly homogeneous sample, then it could be expected that there would be some similarity of response. The students' comments on the questionnaire support this supposition.

Hypothesis 6: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that CoRT-1 has assisted them with their in-class learning.

An analysis of the data supports this hypothesis. Although the percentages are not as strong as for Hypothesis 5, there is still enough evidence to support the hypothesis. The student comments on the questionnaire are generally positive and point towards support for the hypothesis. Perhaps the most support comes from an analysis of the interview data where students express reasonably strong support for the assistance the CoRT-1 program has given them.

Hypothesis 7: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that their in-class thinking has improved.

An analysis of the data supports this hypothesis. Analysing both questionnaire responses shows support for this hypothesis (responses to
questions 1, 3, 5, 8, 10). The students' comments on the questionnaire also point towards support for the hypothesis (Student Responses in Appendix F labelled as 9.1.1, 9.1.3, 9.1.6). The students' interview responses were in most cases quite detailed and positive. Many students retained a reasonable grasp of strategies (8 out of the 10 randomly selected for inclusion) within the CoRT-1 program and judged that aspects of the program had been of assistance to them. As examples, Student Responses 9.2.2, 9.2.3, 9.2.6, 9.2.9, 9.2.10 showed a positive response to the use of the CoRT-1 program and support the hypothesis. Other interview responses showed that the hypothesis should be supported. As examples, only Student Responses 9.3.1, 9.3.12 and 9.3.14, on aspects of metacognition, support the hypothesis. This trend continued throughout an analysis of the rest of the interview data.

**Hypothesis 8**: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that their in-class learning has improved.

Again, an analysis of the data supports this hypothesis. There is stronger support for this hypothesis, throughout two of the areas of data analysis, than there is for Hypothesis 7. In particular, the results for Question 7 of the questionnaire show good support as does the response to student comments on the questionnaire (Student Responses 9.1.2, 9.1.4, 9.1.7). The treatment students' interview responses were positive, as these
examples show, Student Responses 9.2.2, 9.2.3, 9.2.6, 9.2.9; and 9.2.10. The interview responses, on aspects of metacognition, did not support the hypothesis with only a few giving limited support, as in example 9.3.12.

**Hypothesis 9:** Year-Seven students, from a South Coast Comprehensive High School recognise, through their response in questionnaire and interview, that they use the CoRT-1 thinking tools to assist their thinking in out-of-class situations.

The support for this hypothesis is tentative. There is some support in an analysis of the percentages (Question 5), some support in the questionnaire comments (Student Response 9.1.3), and some support in the treatment students interview responses (examples are Student Responses 9.2.1, 9.2.3, 9.2.8). Overall, there is some doubt whether this hypothesis can be supported and it is best left to be considered as a matter for future investigation.

**Hypothesis 10:** Year-Seven students, from a South Coast Comprehensive High School recognise, through their responses in questionnaire and interview, that they use the CoRT-1 thinking tools to assist their learning in out-of-class situations.

An analysis of the data does not show support for this hypothesis. There is very tentative support in the student interview responses, for
example Student Responses 9.2.3, 9.2.4, and 9.2.8. An analysis of all the qualitative data suggests that this hypothesis requires future investigation before any conclusion(s) can be drawn.

**Hypothesis 11:** Year-Seven students, from a South Coast Comprehensive High school recognise, through their responses in questionnaire and interview, that they use knowledge about their thinking and learning processes, to assist them in their thinking in out-of-class thinking situations.

An analysis of the data does not support this hypothesis. There is some support in an analysis of the percentages relating to Question 6, and Student Response 9.1.8 of the student comments on the questionnaire shows tentative support. However, there is not enough evidence across all three sets of qualitative data to suggest that the hypothesis should be supported.

**Hypothesis 12:** Year-Seven students, from a South Coast Comprehensive High school, recognise, through their response in questionnaire and interview, that they use knowledge about their thinking and learning processes, to assist them in their learning in out-of-class learning situations.

An analysis of the data does not support this hypothesis. As in the case of Hypothesis 11 there is some support in an analysis of the
percentages of Question 6 but this can only be used to support a particular case and not to generalise across hypotheses. There is also some tentative support in the student-interview data (for example, Student Response 9.1.8), but again generalisations should not reasonably be made. This Hypothesis is recommended for future investigation.

Support for the recommendation that Hypotheses 11 and 12 undergo future investigation is very strong in the student-interview data. Student-Interview responses, as in examples; 9.3.1, 9.3.2, 9.3.3, 9.3.4, 9.3.5, 9.3.6, 9.3.9, 9.3.11, 9.3.12, and 9.3.14, all suggest that an understanding of how one learns will help both in-school and out-of-school situations. Even though these students may not have yet applied metacognitive skills to assist their thinking and learning, they very strongly point out that they believe the skills will be of great assistance. Consideration should be given to the possibility that the students were making comments designed to please the teacher, but, the consistency with which the comments were made makes the researcher feel that, generally, the comments were made from a genuinely held belief of the students, especially as the students' had been encouraged to make honest responses, without any anxiety.

A second aspect that requires future investigation is the students' lack of knowledge of their preferred way of learning (examples are, Student Responses 9.3.1, 9.3.2, 9.3.4, 9.3.6, 9.3.7, 9.3.8, 9.3.9, 9.3.10, 9.3.11, 9.3.12, 9.3.13, and 9.3.14); and the students' desire to find out about their
preferred way of learning, since they believe it would be of assistance to them (examples are, Student Responses 9.3.3, 9.3.4, 9.3.9, and 9.3.14).

The questionnaire and interview results described in this chapter have revealed that the CoRT-1 treatment had an impact on the in-class thinking and learning of the students. While not all the students applied the CoRT-1 skills to in-class thinking and learning, consistently over 46% of the students did. The analysis has also revealed that giving students an understanding of metacognitive processes probably assists a number of students in their in-class thinking and learning. The next Chapter will discuss the results and issues that arise from them for future research.
CHAPTER ELEVEN

DISCUSSION OF RESULTS AND IMPLICATIONS FOR THE FUTURE

The research questions and major issues for the study were identified in Chapter 7. Results relating to these research questions and major issues were presented in Chapters 9 and 10. In this Chapter, the results and implications for the future are discussed in turn.

11.0 Scholastic Aptitude

There was no treatment effect for scholastic aptitude observed in the study. This means that Proposition 1, listed below, is not supported by the results.

Proposition 1: The Scholastic Aptitude of Year-Seven students, from a South Coast Comprehensive High School, will be enhanced as a result of their being taught the ten-lesson CoRT-1 program.

Even though the null hypothesis associated with this proposition was not rejected, improvements in mean scores from pre-treatment to post-treatment test were observed. The mean score gain from O1 to O2 was 1.01 (SD's 15.363 and 17.998); from O5 to O6 the gain was 4.87 (SD's 13.803 and 16.677); and the gain from O2 to O4 was 9.91 (SD's 17.998 and 17.937). Even with the gain in mean scores the research hypotheses 1 and 2, listed below, are rejected.
Research Hypothesis 1: There will be a significant improvement in scholastic aptitude, as measured by the Otis-Lennon School Ability Test - Level 1 Form F, for Year-Seven students at a South Coast Comprehensive High School, when compared with a control group of Year-Seven students from the same high school, who were not trained in CoRT-1.

Research Hypothesis 2: There will be a significant improvement in scholastic aptitude, as measured by the Otis-Lennon School Ability Test - Level 1 Form F, for Year-Seven students who complete the ten lesson CoRT -1 program.

11.1 Transfer.

There are three possible outcomes of the CoRT-1 program most likely to have had an impact on student performance. First, the CoRT-1 program is designed to encourage students to think in as wide a spectrum as they possibly can, - to take risks with their thinking. Secondly, the CoRT-1 program is a general thinking intervention program designed to be adaptable to many different situations, both in-school and out-of-school. Thirdly, the CoRT-1 program could result in an improvement in how students perceive themselves as thinkers and learners. The second and third possible outcomes of the CoRT-1 program relate to Propositions 3, 6 and 7, as they are listed below.

Proposition 3: Year-Seven students, from a South Coast Comprehensive High School, will judge that CoRT-1 has assisted them in their in-class thinking and learning.

Proposition 6: Year-Seven students, from a South Coast Comprehensive High School, use the CoRT-1 thinking tools to assist them in their thinking in out-of-class thinking situations.
Proposition 7: Year- Seven students, from a South Coast Comprehensive High School, use the CoRT-1 thinking tools to assist their learning in out-of-class learning situations.

Proposition 3 will be discussed in the next section of this Chapter.

Propositions 6 and 7 were not supported by the results reported in Chapter 9. More specifically, neither of the following research hypotheses was supported by the results:

Research Hypothesis 9: Year-Seven students, from a South Coast Comprehensive High School, recognise, through their responses in questionnaire and interview, that they use the CoRT-1 thinking tools to assist their thinking in out-of-class thinking situations.

Research Hypothesis 10: Year-Seven students, from a South Coast Comprehensive High School, recognise, through their responses in questionnaire and interview, that they use the CoRT-1 thinking tools to assist their learning in out-of-class learning situations.

These results appear to be consistent with the immediate outcomes from a number of other program evaluations (e.g. Feuerstein, 1979, 1980; Feuerstein, et al. 1985; Feuerstein, et al. 1986; Hunter-Grundin, 1985). Both the questionnaire and interview results showed that, generally, students did not apply the CoRT skills to out-of-class situations. Only a few students were able to state that they used the CoRT skills out-of-class.

Edwards (1991) found that CoRT-1-trained students showed statistically significant improvements in their social studies and language arts
when they were compared with a control group. Edwards (1991) believed that the social studies and language arts allowed for more freedom of discussion and included work on creative writing, than do mathematics and science. Mathematics and science were mainly taught, according to Edwards (1991), as content-based subjects with little opportunity for the introduction of new thinking skills. Research work by Edwards and Marland (1984a, 1984b) revealed that Year-8 students in science and mathematics were unwilling to use problem-solving strategies beyond those they had been shown by the teacher. The students believed that if other problem-solving strategies were suitable they would have been shown them, giving rise to the perception that general thinking-skills strategies were subject-specific, but not subject-specific to all subjects and situations. A similar perception may have been held by the Year-Seven students in this study, as some of the interview responses and questionnaire comments showed, and this may have impacted on the across-curriculum use of CoRT and transfer.

11.2 The Effect of the CoRT-1 program.

This section will discuss the results in relation to the following Proposition and associated Research Hypotheses.

Proposition 3: Year-Seven students, from a South Coast Comprehensive High School, will judge that CoRT-1 has assisted them in their in-class thinking and learning.

Research Hypothesis 5: Year-Seven students, from a South Coast Comprehensive High School, will judge,
through their responses in questionnaire and interview, that CoRT-1 has assisted them with their in-class thinking.

Research Hypothesis 6: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that CoRT-1 has assisted them with their in-class learning.

An analysis of the data supports Proposition 3 and Research Hypotheses 5 and 6.

As previously mentioned, Edwards (1991) found that CoRT-1 training was associated with positive shifts in students' language arts and social studies achievement. Edwards (1991) commented that "these results provide evidence of potential transfer of CoRT-1 skills to performance in academic disciplines" (p. 28). The results of this study reported in Chapter 9, do not support a similar claim being made for Year-Seven students from a South Coast Comprehensive High School. The language arts and social studies were not specifically studied and the quantitative data analysis did not reveal a significant difference between the Treatment and Control groups, although there were differences in the mean scores in the direction predicted. There have only been a small number of studies of an evaluation of thinking skills programs that have reported short-term achievement gains (e.g. Adams, 1989; Burden, 1987; Perkins & Salomon, 1991), while Edwards and Baldauf's (1987) study of CoRT failed to detect short-term achievement. De Bono (1986) and Edwards (1995a, 1995b, 1995c, 1996a, 1996b) argue that
quantitative techniques measure only the output, and that, important though output is, if the researcher really wants to know what is going on in the mind of the student then the best technique that can be used is to interview the student.

Feuerstein (1979), Feuerstein et al. (1986) and Edwards (1994, 1995a, 1995b, 1995c, 1996a, 1996b) have found that the benefits to students of thinking-skills programs are not fully realised in the short-term, but that it takes several years for the benefits to be fully utilised.

However, an important finding in this study is that, generally, students felt that the CoRT-1 skills were assisting them in some subject areas and in some situations, and that they judged that the CoRT-1 skills would be of assistance in the future in both in-class and out-of-class situations. The diversity of outcomes from an evaluation of a thinking-skills program reinforces the need to combine the benefits of quantitative and qualitative techniques. Reichardt and Cook's (1979) advice is for evaluators "to use whatever methods are best suited to their research needs, regardless of the methods' traditional affiliations" (p.19).

Student questionnaire and interview data revealed that some students judged that the CoRT-1 skills were assisting them with their academic performance. Students also expressed a view that the CoRT-1 skills had a
more ready application to some subjects than to others, a matter already discussed.

Possible explanations for the lack of out-of-class use in Year-Seven could be found in the class groups, the lack of infusion in the curriculum and teacher effect.

The Treatment and Control groups were randomly assigned and initially this could have had an unsettling effect on Year-Seven students who were already coming to terms with new teachers, new peer relationships and new classroom dynamics (to mention only a few of the possible factors). It could be possible that some students recognised the 'value' of a general thinking-skills program and 'planned' to make use of the skills learnt at a future time when their educational agenda was not so crowded with new concepts, ideas and situations.

A strategy to enhance the application of CoRT skills is to infuse the strategies throughout the curriculum. In this study the CoRT-1 program was taught as an additional to the 'traditional' curriculum offering and was presented for only approximately one period per week. This may have had an impact on the student perspective of the 'importance' or immediate 'relevance' of thinking skills to their studies. Some of the students might have thought that, as academic requirements become more stringent, thinking skills could become more 'important'.
There is the consideration that the students did not find the thinking-skills program relevant to their educational needs, but because of the influence of the researcher as teacher, felt some positive remark should be made, so a comment about possible future use is made to please the researcher. This point, if relevant, supports the concept of thinking skills' being incorporated across all curriculum areas and not presented as an 'addition' to an already stretched curriculum offering.

Results from a number of studies of the CoRT program by Edwards (1994, 1995a, 1995b, 1995c, 1996a, 1996b) provide positive encouragement for the practice of including thinking skills across the curriculum. Perkins and Salomon's (1991) concept of "high road" transfer, discussed earlier in this study, gives a justification for the introduction of practice lessons which emphasise the infusion of CoRT skills. Ennis (1989) advocated the use of a mixed approach, which includes an across- and within-the-curriculum approach, which was thought to work best for CoRT strategies. The infusion approach is also advocated by O'Brien, Stapledon, Edwards and Diamond (1993) and de Bono (1986).

The following Propositions and associated Research Hypotheses are not directly related to the impact of the CoRT-1 program; however, in an analysis of the questionnaire and interview data it was found that the hypotheses were supported.
Proposition 4: Year-Seven students, from a South Coast Comprehensive High School, will judge that the explanation of the thinking and learning process assists them with their own in-class thinking.

Proposition 5: Year-Seven students, from a South Coast Comprehensive High School, will judge that the explanation of the thinking and learning process assists them with their own in-class learning.

Research Hypothesis 7: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that their in-class thinking has improved.

Research Hypothesis 8: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that their in-class learning has improved.

As previously reported, the students' questionnaire responses (responses to questions 1, 3, 5, 8, 10) showed support for the hypotheses as did the comments that some students voluntarily placed on the questionnaire in the space provided. The students' interview responses were in most cases quite detailed and positive with many students being able to give a reasonable understanding of the CoRT-1 strategies.

11.3 Learning Process Questionnaire.

Although there is a change in the mean scores in the predicted direction, which does suggest some treatment effect, though not statistically
significant, the results reported in Chapter 9 did not formally support the following Proposition and Research Hypotheses:

Proposition 2: The approach to learning of Year-Seven students, from a South Coast Comprehensive High School, will change as a result of their being taught the ten-lesson CoRT-1 program.

Research Hypothesis 3: There will be a significant improvement in student approach to learning, as measured by the Learning Process Questionnaire, for Year-Seven students at a South Coast Comprehensive High School, when compared with a control group of Year-Seven students from the same school, who were not trained in CoRT-1.

Research Hypothesis 4: There will be a significant improvement in student approach to learning, as measured by the Learning Process Questionnaire, for Year-Seven students who complete the ten-lesson CoRT-1 program.

As reported in Chapter 9 the analysis of LPQ subscale, scale and composite data suggests that there is a noticeable trend within this Year-Seven cohort towards low-achieving, especially towards low achievement motivation and high surface motive. There was little change evident, except in mean scores and then not significantly different, between the pre-treatment scores and the post-treatment scores. A number of factors is suggested which may influence a positive change in this trend.

Classroom structure in the school may affect the students' attitude, and this would be a matter for further exploration. The treatment classes utilised group work, relatively high student interaction and limited teacher talk. These classroom structures and teaching styles may not be evident throughout the
school and may not have been evident in the students' primary-school education. The expected gains of group work include allowing the students to get along with each other, to assist each other, and to increase an awareness amongst the students of each others' strengths and weaknesses. Some research has revealed that these outcomes are not always achieved. Boydell (1975) and Galton, Simon and Croll (1980) have found the interactions within primary-school groups were limited to comparisons between students of the same gender, and were generally not related to discussion of the classroom task. It is not known what the classroom structure and teacher styles are like in the local primary schools from which students involved in this study came, but pre-treatment LPQ scores reveal that, generally, the students came to the secondary school with low achievement motivation and high surface motive attitudes in place. Slavin (1978, 1980); Ziegler (1981) and Lew, Mesch, and Johnson and Johnson (1986), have shown that well-established procedures can facilitate increased primary- and junior-high-school student involvement in co-operative group settings. Stallings, Cory, Fairweather and Needels (1977) and Anderson, Evertson and Brophy (1979) have all emphasised the benefits of active instruction of groups. Other elements which research has revealed are important to the development of a good attitude to learning, for primary- and junior-high-school students, are: time on task (Denham & Lieberman, 1980); time needed to learn (Gettinger, 1985); classroom management (Good & Grouws, 1979); students' awareness of their cognitive processes (Bennett, 1987; Shulman, 1987); and teachers' plans and decisions about teaching
strategies (Shavelson & Stern, 1981; Shavelson, 1983). As Leinhardt and Greeno (1986) and Berliner (1986) have pointed out, the way the 'expert' teacher structures the learning process is a strong influence on the students' attitudes to learning.

The extent to which all these factors (as a representative sample) influenced the attitudes of students in this study, both in the primary and the high school, is not known and, therefore, this lack of knowledge must influence the extent to which the treatment was able to challenge and/or change these attitudes. Perhaps a longitudinal study, involving as many as sixty CoRT lessons and a number of testing occasions, would reveal more. This would be a matter for further exploration.

Biggs (1987a, 1987b) points out that there is a number of things the classroom teacher can avoid doing to make the classroom learning experience a more productive one for students who exhibit low achievement motivation and high surface motive attitudes. Norm-referenced testing should be avoided with evaluation of a student's ability to be assessed utilising criterion-referenced assessment. This avoids a public display of rank orders of competence and allows for a comparison to be made against what the student is able to do, not against peers. Mastery learning "is particularly appropriate" (p. 16) for the self-concept of these students and the teacher should encourage the students to regard success as relating to their own ability, and failure to their own lack of effort. At some point, however, norm-
referenced testing will occur, for example in the New South Wales Higher School Certificate or other examinations.

11.4 Aspects of Metacognition.

An analysis of the results, as presented in Chapter 10, shows that Propositions 8 and 9 and the associated Research Hypotheses 11 and 12, as listed below, are not supported:

Proposition 8: Year-Seven students, from a South Coast Comprehensive High School, use knowledge about their thinking and learning processes, to assist them in their thinking in out-of-class thinking situations.

Proposition 9: Year-Seven students, from a South Coast Comprehensive High School, use knowledge about their thinking and learning processes, to assist them in their out-of-class learning situations.

Research Hypothesis 11: Year-Seven students, from a South Coast Comprehensive High School, recognise, through their responses in questionnaire and interview, that they use knowledge about their thinking and learning processes, to assist them in their thinking in out-of-class thinking situations.

Research Hypothesis 12: Year-Seven students, from a South Coast Comprehensive High School, recognise, through their responses in questionnaire and interview, that they use knowledge about their thinking and learning processes in out-of-class learning situations.

results tend to show that, generally, there is little domain-specific transfer and even less domain-independent transfer. Arbitman-Smith, Haywood and Bransford (Nickerson et al., 1985, pp. 159-160) designed a number of tests in an attempt to answer three questions:

1. Does the program help the students to learn to solve the specific types of problems that are encountered in the program?

2. Does domain-specific transfer occur?

3. Does domain-independent transfer occur?

The research (Nickerson et al., 1985) presents evidence that the answer to all questions is "yes". Edwards (1995a, 1995b, 1995c, 1996a, 1996b) believes that even if a general thinking-skills program assists only one student in domain-specific and domain-independent transfer, it is better to introduce the program, than to have no benefit at all.

The hypotheses argued that the students would recognise that being taught aspects of metacognition would assist them in their out-of-class thinking and learning with only limited support, mainly for Question 6, being found. Further exploration of the issue of transfer is recommended for future research.

Propositions 4 and 5 and associated Research Hypotheses 7 and 8 will now be discussed.
An analysis of the questionnaire and interview data shows that Propositions 4 and 5 and associated Research Hypotheses 7 and 8, listed below, are not supported with regard to aspects of metacognition, but are supported with regard to the CoRT-1 program.

Proposition 4: Year-Seven students, from a South Coast Comprehensive High School, will judge that the explanation of the thinking and learning process assists them with their own in-class thinking.

Proposition 5: Year-Seven students, from a South Coast Comprehensive High School, will judge that the explanation of the thinking and learning process assists them with their own in-class learning.

Research Hypothesis 7: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that their in-class thinking has improved.

Research Hypothesis 8: Year-Seven students, from a South Coast Comprehensive High School, will judge, through their responses in questionnaire and interview, that their in-class learning has improved.

Damasio (1994) believes "the Cartesian-based neglect of the mind" (p. 256) has had "negative consequences" in science and in the effective diagnosis and treatment of human diseases. With regard to science Damasio states that the lack of understanding of the brain has led to a "delay (which) means also that the potential impact that a deep understanding of the biology of the mind might have had in human affairs has so far been lost" (p. 256). This is not to say that the information presented to students as part of this
study constitutes "a deep understanding" but rather a starting point from which students can continue to explore their own thinking and learning processes.

While an analysis of the questionnaire and interview data does not support the research hypotheses with regard to aspects of metacognition, the hypotheses are supported with regard to the CoRT-1 program.

The questionnaire and interview data revealed that a number of students independently applied the CoRT-1 strategies to class activities. Some of these students may have been assisted by their natural disposition to applying general thinking-skills strategies like CoRT-1, while others may have recognised that the strategies may be of more assistance to them in the future. The students' comments reinforce the point, that after the CoRT-1 strategies have been learnt, opportunities should be given for the students to apply the skills to content-specific learning contexts.

The questionnaire and interview data analysis indicates that Year-Seven students at a South Coast Comprehensive High School who have been trained in the CoRT-1 strategies judge that the strategies assist them in their thinking and learning. This analysis supports other claims (Torrance, 1988; Edwards, 1994, 1995a, 1995b, 1995c, 1996a, 1996b; Eriksson, 1990) that general thinking skills, which assist students' performance in such areas as creative thinking, can be successfully taught. Students' responses also
appear to support Adams' (1989) claim that CoRT is a relatively quick program which "opens the door" to thinking.

11.5 Conclusion.

The problem that guided the present study reported in this research work has been stated as a question. The problem was:

**Does the teaching of general cognitive and metacognitive thinking-skills strategies enhance Year-Seven students' thinking and learning?**

In relation to the first part of the question regarding general cognitive strategies, this evaluation of CoRT-1, as an example of general cognitive thinking-skills strategies, has shown that, generally, the students believe that the strategies are useful, use the strategies across the curriculum, but do favour their use in social-studies-type lessons (as opposed to their use in mathematics and science), and recognise that the strategies can be of use outside the classroom, as well as recognising that the strategies will assist them in the future. There is little evidence that the use of the CoRT-1 strategies enhances scholastic aptitude, or that the students' attitude to learning changes. These results appear to support previous evaluations of the CoRT program, and lead to the general hypothesis that Year-Seven
students judge that CoRT thinking-skills training, generally, assists them in enhancing their thinking and learning.

Before the present study commenced, CoRT-1 was thought to be an appropriate program to use for the reasons discussed in Chapter 5. An analysis of questionnaire and interview data suggest that this decision was a sound one. Some of the reasons why CoRT-1 was chosen were reinforced by the students involved in the present study and by teacher observation: namely, the students appeared to enjoy the CoRT lessons, the CoRT materials do not relate to subject-specific content, students do not appear to be disadvantaged in participating in CoRT-1 lessons because there is no requirement of prior academic knowledge, and all contributions are considered equally.

The CoRT-1 program was judged to have a positive effect on student thinking and learning as a result of an analysis of the questionnaire and interview data. Additionally, as shown in the literature review with regard to some thinking-skills programs, and as shown in the evaluation of general thinking-skills programs, there did not appear to be a deterioration with respect to the control group. There were positive gains in mean scores, but not statistically significant gains in scholastic aptitude. Generally, the students' attitudes to learning did not change over the course of the treatment, an understandable result considering the length of the treatment when compared with the time taken for students to develop certain attitudes.
In relation to the second part of the question relating to aspects of metacognition, this evaluation of aspects of metacognition has shown that there is limited support for the general hypothesis that teaching 'thinking about thinking' will enhance students' thinking and learning. An analysis of the data did reveal that this experimental group of year-seven students believe that the thinking and learning processes taught as part of this present study will be of assistance some time in the future. Chapter 10 explored some of the issues in greater detail and it is concluded that aspects of metacognition should continue to be taught across the curriculum. This present study should be regarded as a starting point from which studies in which methodological problems, revealed in this present study, are sought to be remedied.

Overall, the following conclusions have been reached:

1. Provision should be made for students to practise thinking skills across the curriculum. This present study favours the 'infusion' approach across the curriculum. It does not appear that 'one-off' approaches, such as that presented in this study, are suitable for a variety of reasons, not least of which is the students' perception of such approaches, when an 'infusion' approach is not used. It is worth remembering the research conclusions of Feuerstein (1979), Feuerstein et al. (1986) and Edwards (1994, 1995a, 1995b, 1995c, 1996a, 1996b) were it was found that the benefits to students of thinking-skills programs are not fully realised in the short-term, but that it
takes several years for the benefits to be fully utilised. A longitudinal study is recommended with subjects drawn from a much wider cross-section.

2. Students should be given every opportunity to explore their own thinking and learning processes. This present study has shown that the teaching of general cognitive strategies and aspects of metacognition has a positive impact, either soon after the time of teaching or possibly subsequently, on students’ attitudes to their thinking and learning. As previously mentioned, an important finding in this study is that, generally, students felt that the CoRT-1 skills were assisting them in some subject areas and in some situations, and that they judged that the CoRT-1 skills would be of assistance in the future in both in-class and out-of-class situations. Student questionnaire and interview data revealed that some students judged that the CoRT-1 skills were assisting them with their academic performance. Students also expressed a view that the CoRT-1 skills had a more ready application to some subjects than to others.

3. More opportunities should be made available for teacher development in current cognitive and metacognitive strategies. The approach taken in the implementation of the program for this study was that of an additional program to what was already offered as part of the ‘traditional’ year-seven curriculum. For a whole school program to be infused across the curriculum a great deal of training of staff would need to take place. This training would involve not only the CoRT thinking-skills program, and aspects of
metacognition, but also training in the best implementation strategies. The best implementation strategies have been discussed in an earlier Chapter, but to reiterate they would include: cooperative group settings, active instruction of groups, time on task, the development of a good attitude to learning, time needed to learn, classroom management, students’ awareness of their cognitive processes, and teachers’ plans and discussions about teaching strategies. De Bono (1986) argues that group work is fundamental to the CoRT lessons, although his discussion does not identify the skills that students need to be taught before the groups can function effectively. A good starting point for an understanding of effective group skills is the work on cooperative learning, which reportedly promotes academic achievement and self-esteem (Johnson & Johnson, 1989, 1991, 1992; Slavin, 1980, 1987, 1991).

4. For educators interested in enhancing domain-specific student thinking skills and problem solving, especially in mathematics, the research of Sweller (1993), on the use of worked examples, is also suggested as a promising direction for further enquiry. Sweller has suggested that the use of worked examples, as an example of one domain-specific strategy, requires less time, leads to an increase in learning and improves problem-solving performance. Cognitive-load theory, an emerging area of cognitive research is recommended for further exploration.
5. Schools are advised to encourage open discussion, throughout the entire school community, on thinking and learning skills and strategies. Not only would this involve elements of "the thoughtful classroom" (Costa, Bellanca & Fogarty, 1992), but also schools as 'Learning Communities', a concept currently being developed by the Training and Development Directorate of the New South Wales Department of School Education.

6. Educators should be given every opportunity to explore cognitive and metacognitive strategies and be encouraged to use as full a range of them as possible in order to meet the individual needs of all students. Primary, secondary and tertiary educators should be given opportunities to explore the research and the implications of the research for pedagogy. The teaching of thinking skills and an understanding of the learning process can enhance student thinking and learning. The development of future research proposals, which may investigate the dynamics of thinking, learning and general transfer, of program implementation, teacher training, and classroom environment, should add to the growing body of knowledge on pedagogical principles for thinking and learning programs.


APPENDIX A

STANDARD CoRT LESSON FORMAT

(from de Bono, [1986], pp. 52-57)
APPENDIX B

CoRT-1 Teacher’s notes

PMI LESSON OUTLINE

(from de Bono, [1986], pp. 9-12)
APPENDIX C

Student Work Book and Teacher's Notes
(at a 7% reduction from the original)
BIBLIOGRAPHY


6. WANTED ADVERTISEMENTS

In a buying and selling magazine the rate is $1 for the first ten words and 45 cents for each additional five words. The price does not include the phone number. In the following advertisements, disregard non-essential information. Underline what you think is important and then reduce it so that, in each case, you use no more than ten words.

An old retired antique collector from Kookaburra Ridge would like to buy any old clocks, whether or not they are out of order or in working condition. However, he is not prepared to pay excessive prices for them. His phone number is 65 4456.

7. VAN DOOR SIGN

James Black has just started up in business for himself, fixing people's electric toasters, tape recorders, televisions, washing machines, putting in new wiring and equipment. He has decided not to make a charge for working out the cost of new electrical work. He lives at 28 Numbat Parade, Toorak. What do you think the sign on his van door would say?
The Plane Hijacker

A few years ago in the USA, a young man hijacked a passenger flight at gunpoint. He ordered the pilot to fly to a different airport and radioed his demands to the airport authorities. In return for the safe release of the plane and hostages, he asked for 100,000 dollars in a bag and two parachutes. When the plane landed, he was given the bag of money and the two parachutes. He then instructed the pilot to take off again and to fly at a fairly low altitude towards their original destination. When they were over a deserted part of the country, he strapped on one of the parachutes and, clutching the bag of money, leapt from the plane. The second parachute was not used.

He was never found. The task of the police is to find that hijacker. Your task is different. You have to answer one question. Why did he ask for two parachutes if we assume that he only ever intended to use one?
10. Correcting mistakes in copying

Addresses

Greene, Henry 16 Church Road, Northwich, Cheshire. Tel. 0606 4410
Davison, Ann 29a Meadow Lane, Hoddesdon, Herts. Tel. 0992 1440
Greenberg, Roy 102 London Road, Cheam, Surrey Tel. 081 398 0144
Wyman, Gerald 4 The Green, Cheadle, Cheshire Tel. 061 437 4401
Calder, Paul 18 St Martin's Lane, Aberystwyth Tel. 0970 0246
Miller, Fred 5 Station Approach, Clacton, Essex
Lancaster, Jean 82 Westmoreland St, Bexley, Kent Tel. 081 303 6042
Tandy, Louise 44 Smith Street, Bradford-on-Avon, Wiltshire Tel. 02216 5402
Wood, Dorothy 15 Mill Lane, Formby, Liverpool L37. Tel. 07048 4520
Winter, Oliver 11 City Square, Manchester M33 Tel. 061 462 2405

Copy

Green, Henry 16 Church Rd, Northwich, Cheshire. Tel. 0606 4410
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Tandy, Louise 44 Smith Street, Formby, Liverpool L37. Tel. 07048 4520
Woods, Dorothy 15 Millers Lane, Bradford-on-Avon, Wiltshire Tel. 02216 5402
Winter, Oliver 11 City Square, Manchester M33 Tel. 061 462 2405

Total no. of mistakes

SYMBOLS
a silent language

11. The language of symbols doesn't require words but can still convey meaning. Symbols can give instructions, show warnings, direct traffic and interpret music - all this without a single word.

What do each of these symbols mean?

Design your own symbols for
13. **The Two Barbers**

A traveller came to a small town. He had never visited it before, he knew no one there, and he knew nothing about the town or its inhabitants.

He needed a haircut. There happened to be two barber shops close to each other on the main thoroughfare—the only barber shops in town. The man studied each of them with care. One shop was very neat and tidy. Everything about it was smart. The barber was sweeping away the last traces of hair from the floor while waiting for his next customer.

The other barber's shop was very untidy. Everything looked rather run down and ramshackle. The scruffy-looking barber within was lolling on a chair waiting for his next customer.

Both shops charged the same amount for a haircut. After careful consideration, the traveller decided to go to the scruffy barber for his haircut. Why?

---

14. **Hire Equipment for Parties**

Sommers and Company offer the hire of chairs, tables, benches, trestles, sun umbrellas, tents and marquees. Knives, forks and spoons are also available. All types and sizes of plates, cups, saucers, glasses and bowls are obtainable at rates that we believe are most reasonable. We can arrange for the delivery of any hired items. For any further facts or details relating to the hiring of this equipment, get in touch with Arthur on 29 1837 or write to this address: 406 Nebula Street, Galaxy Parade, Lizard Heights.

Reduce to about 25 words.

---

15. **Heaven**

A man died and went to Heaven. There were thousands of other people there. They were all naked and everyone looked as they did at the age of 21.

He looked around to see if there was anyone he recognized. Suddenly, he saw a couple, and he knew that they were Adam and Eve. How did he know?
NOTETAKING EXERCISES

Q 16
PUTTING NOTES IN BOXES — IN SEQUENCE

1. In this exercise, fit your answers into the boxes in their correct order. That means that the sequence in the boxes should follow the order in which the events actually took place. Write BRIEF NOTES, USING ONLY NOUNS.

* What are some of the different types of writing materials that man has used over the ages?

Today, paper is in widespread use as a writing material. Long ago, however, clay tablets were used to record messages and later still animal skins became writing materials.

2. Sort out the proper order of events and put your notes into the boxes below. This time, concentrate on nouns and verbs. Fit your notes into the boxes so that the proper order of events is actually shown. (Name words and Action words)

* Describe the different stages in the manufacture of bread.

(a) The farmer grows the wheat which is harvested.
(b) Here, yeast, salt and water are added to the flour in large mixers to produce the dough that will be baked into bread.
(c) After this, at the flour mill, rollers turn the grain into a powder we call flour.
(d) Some flour is sent to bakeries.
(e) The wheat grain is taken by truck to storage containers called silos.

Q 17

Q 18

Fence
Q 19

1. You are a turkey the day before Christmas. How are you feeling? What sounds are you hearing?

2. You are a plastic rubbish bin, full of garbage. When is the rubbish collection day? How do you feel?

3. You are a kitchen sponge. What other duties do you have to perform?

4. Write about what it’s like being a pair of shoes for a day. Write it from the point of view of belonging to:
   a) a gold miner  
   b) a postman  
   c) a ballet dancer  
   d) a roller skater  
   e) a fisherman  
   f) a fashion model  
   g) a super spy  
   h) a mountaineer

Q 20  The Lost Passenger

Little Billy was four years old and both his parents were dead. His guardian put him on a train to send him to a new home in the country. Billy could neither read nor write nor remember the address, so a large label on a string was secured around his neck clearly indicating Billy’s name and destination. However, despite the best efforts and kindness of the railway staff, Billy never arrived at his new home. Why?

Q 21  The Book

A woman walked up to a man behind a counter and handed him a book. He looked at it and said, “That will be four dollars.” She paid the man and then walked out without the book. He saw her leave without it but did not call her back. How come?

Q 22

You have to decide which of the figures this unfolded version represents.
Q 23

Work through this page across the columns and note how long it takes in minutes and seconds.

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<td>6x3 =</td>
<td>10 + 3 =</td>
<td>30 - 5 =</td>
<td>81 - 9 =</td>
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How might you have organized yourself better?

Your library book is long overdue. You now owe $327.95 in fees. Write to the librarian with a really good excuse.
Explorations of Visual/Spatial Intelligence

The human brain thinks in images. In fact, its capacity to form images or to visualize is one of its most basic mental processes.

Q25 What does this mean? Let's look at an example as we do.

Let your imagination play for a few minutes as we try the following...

In your mind's eye, as vividly as you can, imagine a red balloon.

Now follow your teacher instructions...

In a book, "Seeing with the Mind's Eye," by Nancy and Mike Samuels the following point is made...

The human mind is a slide projector with an infinite number of slides in its library, an instant retrieval system and an endlessly cross-referenced subject catalogue. Visualization is the way we think... The human brain programs and self-programs through its images. Riding a bicycle, driving a car, learning to read, baking a cake, playing golf—all skills are acquired through the image-making process.

Q26 Can you make the "back" change places with the "front?" Now shift them back and forth at will.
Let's look at some more "gestalt shift" visual illusions. Work with each until you can easily make them shift backwards and forwards.

Q27. On the one hand this is an ink smear... on the other a

Q28

Q29

Q30

Q31
2-WAY MAZE

Which two entries will allow you to take routes that will lead you to the centre of the maze?

CANDLEMAKER

You have 64 candle stubs in your possession. You can make one full candle from four stubs. A full candle burns for one hour. Imagine that you can only light full candles. Can you tell us what is the maximum number of hours you can expect to have candlelight from your supply?

SAME SPACE

There are two pairs of shapes of equal area in the diagram below. What are the two pairs?

Bouncing Cheque Loss

You are a second-hand furniture dealer. Your first customer of the day buys a settee for $25 and pays with a cheque, changes his mind and asks for a $15 chair instead. With an empty till, you cash the cheque with a neighbour and give the buyer a $10 note as change.

The cheque bounces and you have to borrow $25 to pay the neighbour. The chair cost you $11. How much money have you lost? $
<table>
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<th>Student's name, then FAMILY name</th>
<th>Their role</th>
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**Roles:**

- **Leader** - keeps everyone on task/keeps everyone together/leads the group as they work through the contract together.
- **Recorder** - answers for the group/ speaks to the class on behalf of the group or works on the blackboard.
- **Monitor** - distributes new sheets of the contract/distributes/folders collects equipment (such as a dictionary or matchsticks) from the front.
- **Manager** - watches the time to make sure the group are not too fast, not too slow. May bring problems to other groups or to teacher. Thus the Manager can move around the classroom, but only when essential.

The group will stay together for 5 weeks normally i.e. 2 groups a term.

If there are three in a group the duties of the Leader and Manager will come together.

*One copy of this sheet is to remain in the Leader's file; the other is to go to the teacher.*
**Contract Sheet 1**

- **Name:**

1. **An archaeologist digs up a section of tiled floor. It looks like this:**
   - The tiles were found on the site. Which tile would be the one to use to complete the pattern?
   - There are four tiles: A, B, C, D.
   - Answer: Tile

2. **A travel agent is offering 20% discounts on flights to various places as shown. The discount % is calculated by their name.**
   - **Crete:** 15%
   - **Jersey:** 20%
   - **Malta:** 15%
   - **Canary:** 20%
   - **Falklands:** ?%
   - Using the information on this board can you work out the % discount on a flight to the Falklands? Answer: %

3. **Look at the numbers. All the mathematical signs have been missed out. You will have to replace the signs so that the sum adds up to 97. Write the sum out in full here:**

4. **The cartoon is all jumbled up. Write the correct order of the boxes here:**
   - Boxes 1, 2, 3, 4
   - Answer: (Number of boxes)

5. **Now write a clever or funny caption:**

6. **Arrange nine dots in a square on a piece of paper like this:**

   - Connect all nine dots with four (no more) straight strokes of a pencil, without raising the pencil from the paper.
   - Only complete it here when you think you have the correct answer.

7. **A deep-sea fishing boat is lying in the harbour. Over its side hangs a rope ladder, with its end just touching the water. Rungs of the ladder are 20 cm apart. The tide rises at the rate of eight cm an hour. At the end of six hours, how many of the rungs will be covered?**

8. **How much earth is there in a hole 1 m. by 1 m. by 1 m? (1 metre deep, wide and long)**
Word Pyramids

Each of the 22 words in the word pyramid below must start with an S and each word must be different.

Rules - one word stops and another starts after a blank space. There are 22 words needed and all must begin with S.

A man lives on the tenth floor of a building. Every day, he takes the elevator to the first floor to go to work or to go shopping. When he returns, he always takes the elevator to the seventh floor and then walks the remaining flights of stairs to his apartment on the tenth floor. Why does he do this? (In Australia we use the word lift for elevator.)

Clues:
Q: Is there anything that he does between the seventh and tenth floors other than climb stairs?
A: No.
Q: If he lived on the sixth floor, would he go up to the sixth floor in the elevator?
A: Yes.
Q: If he lived in a different block of apartments in a different country but still on the 10th floor, would he still get out on the 7th floor when going up?
A: Most probably yes.

Your guess why: ____________________
"Born To Shop" is a popular slogan in New York where "shopping is a way of life" was invented. The ordinary old shopping bag has reached new heights in status. Exhibitions of shopping bags have been held by museums and art galleries in the United States of America and in Australia. (It's true!)

Design a new shopping bag for one of the following:
- Woolworths Supermarket
- A trendy clothing boutique
- A take-away fish & chip shop
- A car spare parts dealer

Come up with a catchy film title:
Here is the plot of the film. Read it carefully. The director has asked you to think of a name for his film which "has to be brief, has to hint at what the film is about" and has to "stick in people's minds."

Here is the film plot:
A New York private investigator, who has too much money in the bank that he never really needs to work, is told by phone that his sister has been taken prisoner and is being held captive in a secret location. The investigator is told that, unless he is prepared to stop his present enquiries into the recent theft of 2,000 pairs of rugby boots, 50 hockey shirts, 75 pairs of shin pads, 100 nylon rugby football jerseys and 12 cricket bats from a local sports store, they will spread lies about him around the city that will ruin his chances of working as an investigator again.

Your catchy title:

Answer: socks

Unravel these advertisements which have words in the wrong order and read like nonsense:

(a) FOR SABLE
Chocolates, homemade by ladies with very soft centres (see over)
What's silly about the way it reads? Name ____________

Rearrange the sentence so that it makes sense:

WANTED:

b) A cottage by a retired couple covered with creepers, what's silly about the way it reads?

Rearrange the sentence so that it makes sense:

Q 15 An archaeologist digs up a section of a tiled floor. It looks like this:

A
H
B
G
W
D
X
C
E
M

These other tiles were found on the site, which tile would be the one to complete the pattern?

Answer: Tile ________ because ________

Q 16 GUESS WHAT THE SIGN SAYS?

A sign, over the doorway in a social club, states that only people who have paid their membership dues are permitted in the room. Use two words only.

Q 17 WHAT WOULD YOU HAVE DONE?

1 One day I drove up a country lane, parked my car in the shade of a large tree, and strolled towards a nearby house to make a business call. I was barely out of my car when a fierce dog lunged at me. Fortunately, he was chained to the tree and I managed to get out of his reach. Finding no one at home, I walked back towards my car. The dog growled and lunged again. His chain was long, and my car was in such a position that he could easily cover both doors. Can you guess how I got into my car without being touched by the animal?

Q 18 The cartoon is all jumbled up. Write the correct order of the boxes here:

Now write a clever or funny caption:

Q 19 Write 5 reasons ________ for ________ ________ ________ ________ ________

Choose one only!
Q 20. The leader should lead the group to work on scrap paper to answer this question. Take all answers + then gradually work them into a single answer. Recorder: you to this. Manager: Allow 10 minutes. When polished and complete all copy the agreed 8 words onto the lines below.

SELLING

A boy has a number of budgerigars, pupa and guinea pigs that he would like people to buy from him. His mother suggests that, if people find that there is no-one at home when they call, they should be directed to their sole neighbour who will then deal with them. He writes 8 words on the sign which he then places on the lawn. Try to write the notice for him.

Q 21. The Dream

The boss of a storage warehouse had just arrived at work when one of his employees burst into his office. The man explained that while asleep the previous night he had dreamed that one of the stored boxes contained a bomb that would explode at two p.m., causing a terrible fire. The boss was skeptical, but agreed to investigate. After a search, a bomb was found in the area foreseen in the man's dream. The police were called, the bomb defused, and a tragedy averted. Afterwards, the boss thanked the employee sincerely and then fired him.

The sacked man had not planted the bomb, and his prophetic dream had saved the warehouse from destruction. Yet the manager was right to fire him. How could that be so?

Having problems after 5 minutes discussion? Manager is to come to the. Clue card box + take clue card back to group. Discuss - write answer below - return card.

Q 22. Use group work and your scrap paper to work this one out.

Answer: MUG _____c. STRING _____c.

A mug and a ball of string cost a total of 75c. The mug costs 25c more than the string. What is the cost of each?
Q25. Can you make eight 8s equal 1000?

Leaders: have the group do their working on scrap paper.
Clue: set up an addition sum using the eight 8s (8, 8, 8, 8, 8, 8, 8, 8)
The answer to this addition sum should be 1000.
When you have worked it out write your answer here:

1,000.

Q26. When tomorrow is yesterday today will be as near to Sunday as today was when yesterday was tomorrow. What day is it?

Q27. GROUP WORK ALLITERATIVE SLOGANS WRITE ANSWERS BELOW

In alliteration, a group of words starts with the same letter. Try to make up some alliterative slogans for the people who run these businesses. The first one is done for you as an example:

1. Charlie would like customers to eat and munch his fried potatoes.

Charlie's Crunchy Chips

2. Freda sells gladios, dahlias, roses and chrysanthemums, which are all just picked (3 words)

3. Polly would like everyone to buy her pillows which have colourful designs on them (4 words)

4. Tim produces a sign, exhorting people to give his tomatoes a go. He believes they have plenty of taste and flavour (4 words)

5. Walter has some eccentric and unusual wrist watches and thinks that everyone should have one on their wrist (4 words)

6. Bernie would like everyone to come and have a good look around the books in his store. All his stock is at discount prices (4 or 5 words)
CLUE FROM PAGE 1:
Q: Was there something about the cup itself that identified it?
A: No.
Q: Was the fly still in the cup?
A: No.
Q: Could the man have known it was the same cup if he had not tasted it?
A: No.

Q: Here is a news report that your reporter has just sent in.

You are the editor who want to make it your page story. Come up with a SENSATIONAL HEADLINE.

The Grenada Hotel, and old, historic, wooden-panelled building built in the early coaching days, went up in flames during a fire which is believed to have started in a bedroom. Damage to walls, floors, furniture and fine artwork and antiques was extensive, and repairs are expected to total in the region of $100,000. A police spokesman, talking to our reporter, said that an early guess as to the cause of the blaze put it down to an electrical fault. Fortunately, no-one was injured in the blaze, largely as a result of early warning. However, despite the fact that three fire brigades eventually attended the blaze — one even arriving within minutes of the start of the fire — they were helpless against the fierce flames which had taken a strong hold.

Now come up with a responsible headline. (A matter of fact headline — one that is true & factual).

Now imagine the newspaper is nearly ready to print & the report comes in only in time to write it up briefly as a STOP PRESS item. 15 Mention only the essential important points/don't go into too much detail.

In no more than 45 words.

COMBINATION

Here is a combination lock to the postal bag that the young cashier has to take to the post office. It can be opened by putting the key into the correct locks in order. You can only follow the thin black lines, and the combination must add up to 63. How many different combinations are there?

Q:39 Shunt: A locomotive, L is on the main line of a railway. The trucks, marked 1 and 2 in the diagram, are on sidings which meet at the points

Hint - draw rails on paper
- use little pieces of paper as your trucks
- and locomotive as you do your planning.

The problem is to swap the positions of the two trucks and leave the locomotive in its original position on the main line. The locomotive may push or pull the trucks — it may go between them, pulling one and pushing the other — but no truck may move without the locomotive.
The Coffee Drinker

A man in a restaurant complained to the waiter that there was a fly in his cup of coffee. The waiter took the cup away and promised to bring a fresh cup of coffee. He returned a few moments later. The man tasted the coffee and complained that this was his original cup of coffee with the fly removed. He was correct, but how did he know? Clues on the back of this sheet, but the group is not to look at them until they have had a good discussion. Answer below.

Show how you can make 6 sixes (666666) equal 144. (Clue - make up a 4 line addition sum)

There are 5 apples in a basket and 5 people in a room. How can you give an apple to each person and still leave an apple in the basket?

The Two Americans

There were two Americans waiting at the entrance to the British Museum. One of them was the father of the other one's son. How could this be so?

How many triangles are there in this diagram?

Clue: The answer is more than 15 yet less than 26.

Here are 3 very special numbers - 4, 0, 5. (By the way, 4 is a number?) If you put them in the right order you will get a three-digit number. If you subtract 8 from it, the result will be divisible by 8. But if you add 9 to the same 3-digit number the result is divisible by 9. Wait!! There's more!! If you take the same 3-digit number and subtract 7 from it, the result is divisible by 7. What is the 3-digit number?

There are 10 horse stalls:

Now try to fit 9 horses into the stalls so that each is filled. Warning: this is a lateral thinking exercise - you can't divide a horse and each stall is a separate box. (It's not a very serious exercise!)

A man had a square swimming pool in the centre of his fairly large yard, but at each corner there was a tree growing so that looking down it looked something like this:

How could he double the size of his swimming pool, keeping it square, without cutting down or moving any of the trees?

CRYPTARITHMETIC

In the following two puzzles, each letter represents a different digit. Your task is to discover which digit each letter represents. Some clues are given to help you on your way.

a) Send More Money

Clues for a) M = 1; D = 7; E = 5
R = 8
SEND
MORE + FORTY
MONEY

b) Sixty

Clues for b) T = 8
N = 0
MONEY
SIXTY

Clues for a) M = 1; D = 7; E = 5
R = 8
SEND
MORE + FORTY
MONEY
Question 40. OBSERVING, READING & CONCENTRATING.

There is one drawing left over. It is in the ______ row, ______ from the left.

Pick out the picture that is being described, by placing its number in the correct box above (underneath the cartoon it describes).
1. This man is wearing spectacles, is bald and is smiling.
2. This man has curly hair, is wearing a plain tie and has a small, straight nose.
3. This man has straight, black hair, is wearing spectacles and a striped tie.
4. This man is wearing a plain tie, has large ears and is bald.
5. This man has small ears, a curved nose and has curly hair.
6. This man is bald, has a curved nose and is wearing a striped tie.
7. This man has a moustache, is bald and is wearing spectacles.
8. This man has curly hair, is wearing a plain tie, has small ears and is wearing spectacles.
9. This man has straight, black hair, is tieless and has a small, straight nose.
10. This man is bald, has a small, straight nose and small ears.
   He wears spectacles.
11. This man has a moustache, has curly, black hair and small ears.
12. This man is bald, has a moustache and is smiling.
13. This man has a moustache, is wearing a striped tie and has large ears.
14. This man has curly hair, is wearing a striped tie and is smiling.

A painter required three days to paint a room. How long would it take him, working at the same rate, to paint a room twice as long, twice as broad and twice as high? (The answer is not 6 days)

Express 100 by using the same figure six times.

64 ? 4 ? 4 = 10

Answer 64 4 4 = 10

In the puzzle below there is a perfect star shape. Find it, then colour it in.
This diagram is sometimes called "The Devil's Cricket Stumps". Study it and see if you can understand it. Explain how it works to someone in your group.

Now on your scrap paper (using a pencil, rubber and ruler) try to copy it.

Two motor-cycle policemen paused behind a large hoarding to lie in wait for speed-limit offenders. One looked up the road, the other looked down it, so as to cover the whole stretch.

"Jim," said one without turning his head, "what are you smil- ing at?"

How did he know that Jim was smiling?

From the four objects on the right, choose the one that is identical to the target object.

The cartoon is all jumbled up. Write the correct order of the boxes here:

Now write a caption:

You are the editor of a newspaper that has just received this news report:

The oil tanker "Morris Dance" was holed on a rock early this morning. Massive oil seepage is occurring in the immediate area surrounding the vessel and this could pose a serious threat to local wildlife and pollute tourist beaches nearby. Three separate local councils expressed great concern that beach pollution could seriously affect them just prior to the holiday season. Off-loading of 40,000 tonnes of crude oil, still in the vessel's tanks, is to be attempted at some time today. Salvage work is being greatly hampered by exceptionally wild seas and the fact that the tanker is slowly sinking. An oil company spokesman described the procedure as a "race against time".

Come up with a SENSATIONAL HEADLINE:

Now come up with a RESPONSIBLE HEADLINE (a matter of fact headline - one that is factual)

Write a STOP PRESS item of 20 words:
(Rough it out on scrap paper first)
Q50: One evening an insect flew into my car on deep in reach. It started to crawl and buzz, sounding as if a circular saw were operating in my head. Can you guess how I got it out?

Q51: You are an archaeologist and the main pattern on an ancient tile floor is shown, but one piece is missing. Which of the loose tiles (A B C D E F G H) will be needed to complete the pattern? Answer

Q52: Read and follow the instructions: Here is a maze which you will find in Somerset, England.

1. You need to follow the black path (it is made of lawn). Try to follow it with your eyes at first - don't use a pen or pencil - see how far you get before you become confused.

2. Then use a biro or pencil. Remember it is the black path you must follow.

Q53: Really give these some thought to this exercise - one or two words only. SUITABLE HOUSE NAMES

Provide what you think would be suitable house names, if the owners lived in the surroundings described.

1. From the house there was a view of hills to the west, which were usually mist-covered.

2. The owners lived at the foot of a hill where it was usual to have beautiful sunsets.

3. There was little grass, the place was set on a windswept plain in a harsh outback location.

4. The house was close to a river that only occasionally ran with water.

Q54: A lateral thinking teaser...

Five Men

Five men were moving up a path up a hill towards a church. It began to rain. Four of the men quickened their step and began to walk faster. The fifth man made no effort to move any faster. However, he remained dry and the other four got wet. They all arrived at their destination together. How could this be so?

N.B. They relied only on foot power!

Q55: Coal and Feathers: which weighs more: a ton of coal or a ton of feathers?

Q56: Who is the strongest of the 4 weight lifters? You will need to do a diagram or make notes to sort this one out.

Weight Lifters

Boris, Sergei, Tam and Viktor are weight lifters. Viktor can outlift Tam, but Sergei can outlift Viktor. Tam can outlift Boris, but Sergei can outlift Tam.
Noughts and Crosses: probably everyone knows this very old game, also called Tic-tac-toe. Two players draw a frame like the one opposite and take it in turns to enter a nought or a cross in the spaces, with the aim of being the first one to complete a line of their own symbol across, down or diagonally.

Now read these rules. You are to take turns around your group playing each other. Everyone is to watch as two people play each other. The leader should organise it so that (i) all the games are completed (ii) all the group members play different people (iii) the whole group is watching and thinking as each game is being played.

Write a record message for your telephone answering service. Tape it.

When finished the group member with the most lines showing the best their opponent is the winner.

Did you notice any rules coming through as the games were being played? i.e. if a person started to explain they often got to win etc. etc. Write these here after a group discussion.

What do each of these road symbols mean?

1.

2.

3.

4.
**WORKSHEET**

**Q57** Begin this puzzle at point "A." Try to trace the pathway to the opposite point "B."

**Q60** Join all the dots as shown to the left using only 8 lines and without lifting the pencil from the page as you go.

**Q61** Think of 5 different names for a house mouse.
1. 
2. 
3. 
4. 
5. 

**Q62** Design the perfect mouse trap - or the most ingenious one.

**Q63** Mouse Acronyms: For each letter of the word MOUSE write a sentence that tells something about mice.

**Q64** What is so different about your mousetrap?

---

**CREATIVITY**

**Q62** Design a perfect mousetrap:

- Trap:
  - Design the perfect mousetrap - or the most ingenious one.

**Q63** Mouse Acronyms: For each letter of the word MOUSE write a sentence that tells something about mice.

1. M: Did you hear about the mouse who nearly drowned?
2. O: Grabbed by its mother and a mouse to mouse recession?
3. U: S: E
GROUP WORK - All working together to get 100%.

Write in the contraction...
1. He would not go.
2. I do not accept it.
3. He does not know.
4. That is not so.
5. It is not right.
6. Let us go.
7. I will not let you.
8. Off the clock.
9. I cannot agree.
10. I will join in.
11. I shall not go.
12. We are ready.
13. Are you?
14. Who is going?
15. Tom is going.
16. The valley is steep.
17. Who are asking?
18. They are leaving.
19. Who will come?
20. You are awful.

GROUP WORK - Thinking together to solve a problem.

In each group of words, underline the word that best matches the word or words in bold type:

(a) two, too, to
(b) their, they're, there
(c) your, you're
(d) whose, who's
(e) its, it's
(f) where, were
(g) course, course
(h) quiet, quite
(i) no, know
(j) new, knew
(k) die, dye
(l) threw, through
(m) principal, principle
(n) allowed, aloud
(o) advice, advise
(p) practice, practise
(q) current, currant
(r) desert, dessert
(s) lightning, lightning
(t) check, cheque

also
in that place
you are
who is
belonging to it
past tense of "was"
not fine
not noisy
negative
understood
stain
tossed
guiding rule
permitted
to counsel
to train
running stream
area with low rainfall
making less heavy
to stop, hold back

You are a scientist working for the museum. Your job is to reconstruct a prehistoric creature from these recently discovered bones.
The Pigs in the Sties

Joe once bought ten pigs in the market, but when he got home, he realized that he had only nine small sties to keep them in. He was puzzling over this, when his neighbour, Tom, walked over. Joe explained his difficulty. 'Nothing to it, Joe,' said Tom. 'Just do as I say.' So, following Tom's instructions, Joe put the first two pigs in sty No. 1. Then he put the third pig into sty No. 2, the fourth in sty No. 3, the fifth in sty No. 4, the sixth in sty No. 5, the seventh in sty No. 6, the eighth in sty No. 7, and the ninth in sty No. 8. He then told Joe to take one of the pigs from sty No. 1 and put it in sty No. 9. 'Now you've got all the pigs in,' said Tom. Joe agreed, and was about to close up the sties, when he heard a grunting sound. 'Wait a minute, Tom,' he said. 'I've still got one pig left over!' What went wrong?

How many triangles can you find in this hexagon?

Perception:

Look at the circle in the centre of the circles in both drawings above. Which is bigger - the one on the right or the one on the left?

Arrange these sums in their correct order. (You will need to do them first.) List them in a column here:

37 x 9 = 37 x 12 = 37 x 15 = 37 x 18 = 37 x 27 = 37 x 3 = 37 x 4 = 37 x 6 =

YOU DIVIDE UP THE LAND.

A farmer had an orchard in which 12 apple trees grew, as shown in the diagram below. When he died his will stated that the orchard should be divided between his 4 children. Each child was to have a piece of the orchard containing 3 apple trees. So each piece of land was to be the same shape.

Is the circle below a perfectly formed circle, or is it partly out of shape?

Write your answer above, why do you think this?
The Phone-In

Recently there was a television phone-in in which a well-known legal man was answering listeners' queries. He answered various questions, and then one man came on the line and said he wanted to know about the matrimonial laws. 'Yes,' said the legal man. 'What is it you wish to know?' 'I would like to know if the law allows a man to marry his widow's sister,' said the listener. 'The law has nothing to say in the matter,' said the legal man. 'But if you are the man in question, I very much doubt if you'll ever get the opportunity.' Why should this be?

At the Bank

A messenger arrived at an office one day with a parcel. At the enquiry desk, the messenger asked for Miss Robinson. 'I have to hand this parcel over to Miss Robinson personally,' explained the messenger. 'Well,' said the girl at the enquiry desk. 'As a matter of fact, I'm Miss Robinson.' The messenger was about to hand over the parcel, but hesitated. 'Er - I'm sorry, but how do I know you are Miss Robinson?' The girl smiled. 'I think I can prove that,' she said, and felt in her handbag. She produced a photograph of herself, and showed the messenger. 'There. A pretty good likeness, isn't it?' she asked. 'Oh yes,' said the messenger, quite satisfied. 'Here's your parcel.' What mistake had he made?

A coin (see above) was taken to a London auction house by a woman who said she had found it in her garden while digging a new flower garden. She knew that her house had been built on the site of an ancient Roman camp, because she had found one or two small items before. But this was a fine coin - and it was in excellent condition. She wanted to put it in the firm's next sale.

The experts examined the coin and said to her, 'I'm afraid we can't accept this. In fact you are lucky we haven't sent for the police, had you arrested.' Why did he say this?

Tarte de Framboise

Take figges and boyle them in wyne and grynde them smalle. Putte them in a potte and adde powder of peppir, gynger, raysons and salte. Then make a faire low coffin and putte this stuffe therein. Bakke in the oven for an houre. This tarte de fruyte is verye helthsome.

The Mouse

A mouse found a box in which there were a number of ears of corn. It started to bring them out, three ears on each journey. It took nine journeys to remove them all. How many ears were there in the box?
The Two Indians

One day, in a Red Indian encampment in the United States, a big Indian, Strong East Wind, and a little Indian, Happy Hunter, took their tomahawks and set off for the distant hills. Happy Hunter was the son of Strong East Wind. But Strong East Wind was not the father of Happy Hunter.

How can this be the case?

Strange Symbols

Here is a sequence of what appear to be very odd symbols. They are, in fact, in a proper logical sequence. Can you draw in the symbol which should follow?

\[
\begin{align*}
\square & \quad \circ & \quad ? & \quad \square & \quad \circ
\end{align*}
\]

Correct Sequence:

Humorous or Eye catching Title:

Rectangles

Can you say how many rectangles there are in this diagram?

\[
\begin{array}{|c|c|c|}
\hline
& & \\
\hline
& & \\
\hline
\end{array}
\]

Which of the circles are the same? Write your answers out in full: a) 

1 

2
Q79 Which of the 4 outer shapes aren't true circles?
Answer: ________________________________

How would you prove this:

______________________________
______________________________

Q80 How many straight lines are there in the illustration below?
Answer: ________________________________

Q81 Do these sums and then study both the sum and the answer. What rule seems to apply?

\[
\begin{align*}
142,857 \times 1 &= \\
142,857 \times 2 &= \\
142,857 \times 3 &= \\
142,857 \times 4 &= \\
142,857 \times 5 &= \\
142,857 \times 6 &= 
\end{align*}
\]

Q82 Work out how to make the bird fly straight into the snake's mouth. Now write your instructions in full for someone else to easily follow:

Q83 The Home Secretary

In the British House of Commons, the Home Secretary rose to report on crime statistics. 'There has been an alarming increase in the number of deaths from poisoning,' he said. 'probably because so many poisons are easy to come by. This means that the number of undetected murders rose from a total of 1400 in the previous year to 2600 last year.'

'Absolute nonsense,' retorted the Leader of the Opposition. Why should the statement be described as nonsense?

Q84 Family Party

A family gathering included 1 grandfather, 1 grandmother, 2 fathers, 2 mothers, 4 children, 3 grandchildren, 1 brother, 2 sisters, 2 sons, 2 daughters, 1 father-in-law, 1 mother-in-law and 1 daughter-in-law. Yet there were only seven people present. How can this be?
The Two Indians

One day, in a Red Indian encampment in the United States, a big Indian, Strong East Wind, and a little Indian, Happy Hunter, took their tomahawks and set off for the distant hills. Happy Hunter was the son of Strong East Wind. But Strong East Wind was not the father of Happy Hunter.

How can this be the case?

Strange Symbols

Here is a sequence of what appear to be very odd symbols. They are, in fact, in a proper logical sequence. Can you draw in the symbol which should follow?

\[ \text{Correct Sequence:} \\
\text{Humorous or Eye catching Title:} \]

Rectangles

Can you say how many rectangles there are in this diagram?

\[ \text{Which of the circles are the same? Write your answers out in full: a) } \]
Jungle Plants

Jungle plants grow quickly all around the year because of

At the tops of the trees an unbroken carpet of leaves is called the

This is where many animals find their food.

There are many jungle trees that man finds useful. Latex is obtained from

trees in Asian jungles.

and are made from the beans found inside cacao pods. Furniture and boats are often made from trees like

and cutting down trees, timber cutters often cut the trunk above the wide, thick roots.

and pineapples are jungle fruits grown by men whilst cooking oil is made from

There are many unusual jungle plants and

grow high up on tree trunks, searching for light. The biggest flower in the world and one which has no leaves is

Q 2

QUESTIONS

1. What was the occupation of Grace Darling's father?
2. What caused Grace to wake in the early hours of the morning?
3. What did the early morning light reveal to Grace?
4. Why did her father hesitate to do what she asked him?
5. How did she and length succeed in getting him to do what she asked?
6. What urged them on to brave the rough sea in their boat?
7. What did Grace do while her father investigated the wreck?
8. How do you know that Grace was skilful in managing a boat?
9. For how long did Grace and her father look after the survivors?
10. What great sadness came to Mrs. Dawson?
1. A ... is like a house with two storeys. The bottom part is the ... This is where the ... lays her eggs. The top part is called the ... is made and stored here.

2. In the ... Desert, very little falls. It is very hot. This makes it hard for ... to grow. Because there are few trees and plants, there are no ... to hold the earth. Loose earth is easily blown away by strong ...

3. ... is needed by nearly all forms of ... in the world. It is transparent. When water freezes, it turns into ... and can float. The ... can turn water into a ..., which rises to make ...

4. At one time many ... died from ... on board ... Captain ... proved that scurvy could be avoided. He made his sailors eat ... and ... on his ships. In this way the ... of sailors improved.

5. In 1783, a paper ... rose 2000 into the air. The ... brothers had sent it up by filling the balloon, with hot ... over a straw ...

Q.10. LISTENING. QUESTIONS - PROTECTIVE COLOURING.

1. What is the main reason why most animals have distinctive colouring?
2. Can you account for the colouring of some desert animals?
3. Why is the tiger striped?
4. Why is the leopard spotted?
5. Why are most hen birds less brightly coloured than the males?
6. What reason is given for Nature's giving a few hen birds a colour that is brighter than that of the male bird?
7. Why are some fish dark above and pale below?
8. What did you discover about fish that live in the depths of the ocean?
9. Why are some sea animals as transparent as glass?
Q11. At Niagara Falls, the river Niagara narrows so much that the water speeds over a number of rapids. Just before a massive drop over a tall cliff into a raging whirlpool, Goat Island splits the river into two. Spray fills the air often blots out the view.

Horseshoe Falls is on the Canadian bank and has a drop of fifty metres. Erosion is so strong that two metres of the Falls are eaten away annually.

Large numbers of tourists visit Niagara Falls, especially in summer. In winter, giant icicles dangle from the lips of the waterfalls.

Nearby hydro-electric plants use the massive power of the river to generate electricity.

Skin reading _______ seconds/answer

P. Main point:

Q. Main point:

P. Main point:

P. Main point:

P. Main point:

LISTENING QUESTIONS: THE CORAL ISLAND

1. How many were in the party?
2. How had they come to the island?
3. How do you know that they had been on the island but a short time?
4. Where did they go?
5. What were their feelings as they stood on the sandy beach?
6. Describe briefly the vegetation.
7. What did they see a mile beyond the shore?
8. Why was the water nearer the shore "as calm and smooth as a pond"?
9. How do you know that the sun was shining?
10. What did they discover about the coral reef after they had been on the island for some time?

Q12. In 1933, Edmund and Sherpa became the first men to climb Mount Everest. Hillary was born in 1928 and started climbing after the Second World War. The Sherpa's, some times climb and rub birds. They are large and hairy. They eat small like and Some goannas are as small as thirty centimetres whilst the biggest may be as long as 4.5
1, 2, 3, 4 - Find the odd one out.

Answer 1d
1 Because symbol d is the only one that has two openings.

Answer 2a
2 Because the crosses are arranged differently from the others (2 above, 1 below).

Answer 3c
3 Because a and e (right-angled) and b and d (acute angled) make pairs, so that c is the odd-one-out, being obtuse.

Answer 4a
4 Because b and e as well as c and d make pairs (same height), that leaves a, as it is in between the two sizes and, moreover, it is round.

Q9: The Plane Hijacker: 5 questions & answers that may help your thought.

• Q: Did the man change his mind during the course of the hijack?
  A: No.

• Q: So he always intended to leap out of the plane on his own?
  A: Yes.

c. Q: Did he carefully choose one parachute in preference to the other?
  A: No.

• Q: Did he ask for two parachutes in order to deceive the airport authorities?
  A: Yes.

c. Q: Did he do this to protect himself?
  A: Yes.

The Plane Hijacker

The hijacker asked for two parachutes (it is believed) in order to deceive the authorities into thinking that he intended to take a hostage. They therefore gave him two good parachutes. Had he asked for one only, they would

have known it was for him and could have given him a dud parachute with a hole in it. By asking for two, he eliminated that risk. Once he knew he had two good parachutes, either would do for his escape.

Correcting Mistakes (Question 10)

1 Compare the first list of addresses with the copy opposite. Mark the mistakes in the copy. Record the number of mistakes at the end of each line of the address in the copy. In each address there may be no mistakes, or one or more.

Q11 Total number of mistakes: 31

Errors in individual cases:
Greene: 4 Davison: 0 Greenberg: 5
Wyman: 3 Calder: 3 Miller: 3
Lancaster: 5 Tandy: 3 Wood: 4
Winter: 1

*Counting town and county/district as 1.

Q13 The Two Barbers: 4 questions & answers that might help your thought.

• Q: Was the man making a considered and rational choice in going to the scruffy barber?
  A: Yes.

c. Q: Was his choice governed solely by the desire to get a good haircut?
  A: Yes.

c. Q: Did he make the right decision?
  A: Yes.

c. Q: Had he seen examples of each barber's work?
  A: Yes.
Heaven: 3 questions and answers that may help your thought.

Q: Was there some physical difference that distinguished them from all others?
A: Yes.

Q: Would it be immediately apparent to any observer?
A: Yes.

Q: Was it related to the fact that they were the first two humans?
A: Yes.

Heaven

Adam and Eve were the only people there without navels. Because they were not born, they had never had umbilical cords and, therefore, did not have 'belly buttons.'
TEACHER SHEETS FOR PAGES 5, 6, 7, 8 THINKING SKILLS.

Page 5, Q. 16

Largely self explanatory - you will have to guide.
A preparation for Note making — a thinking skill
that many of our students don’t have, but
badly needed.

Page 5, Q. 17 1—8.

From an American Thinking Aptitude Test.

Basically the patterns of the symbols in the squares
to the left of the vertical dividing line, have to be
discovered.

Each row has then to be completed by one of the
squares to the right of the vertical dividing line,
by circling the correct letter a, b, c, d.

Answers: 1 d; 2 c; 3 a; 4 c; 5 a; 6 b; 7 d; 8 a.

After they have done the first 2 or 3 ask students
how they are thinking about solving each puzzle.

(Preadolescents in thinking tend to work from left to
right to establish the pattern — those who say they
sweep from left to right to establish a pattern then
jump from the first to the third, then from the second
to the fourth all are more capable.)

Page 5, Q. 18 “Fence”.

Get students to copy the drawing onto a scrap piece
of paper. Set time — say 5 minutes. Urge them to
take care and take in every detail. BE EXACT!!

Close booklets.

Now they must answer the following questions only
from their copied drawing.

Questions
1. Does the little man part his hair?
2. Does he have eyebrows?
3. Can you see his thumbs?
4. Are nostrils shown?
5. How many fence boards are there?
6. How many nail heads are shown?

7. How many flowers are there altogether?
8. How many plants are there?
9. Are the fence posts cut off level with the fence
   or are they taller?

Now...

Swap for marking.
The person marking to be honest & to mark from original.

Conclude with a score & a discussion on accuracy,
following instructions, being observant etc.

Page 6, Q. 19 Friendship or Teacher designated groups Q 2.

Suggest groups tackle 1-6. 10 minutes to write.

Report back — should be fun.

Similarly with 7. Individually choose 1. (Six minutes
to write +1 or 2 readings per point of view.)

Page 6, Q. 20

Lateral Thinking Skills:

Discuss in pairs for 2 minutes.
Listen to interview.

The Lost Passenger

Q: Did someone deliberately harm or abduct Billy?
A: No.

Q: Was his label removed in some way?
A: Yes.

Q: Was Billy a little boy?
A: No.

Q: Did Billy destroy the name tag?
A: Yes. (He ate it!)

Answer: The Lost Passenger

Little Billy, as his name suggests, was a goat who unfor-

tunately ate his label, so no one knew where he was sup-
pended to go!
Page 6  Q 21
Lateral Thinking Skills:
Discuss in pairs for 2 minutes.
Listen to interviews:

The Book
Q: Was he surprised that she left without the book?
A: No.
Q: Did she pay the money to buy the book?
A: No.
Q: When she gave him the money, did she receive something in return?
A: No, not really, but she was quite happy to pay it.
Answer: The Book
She was returning an overdue library book.

Page 6  Q 22
The folded out flat plan of which figure?
Circle a, b, c, d.
Answers: 1 a; 2 d; 3 b

Page 7  Q 23
As for instructions, then discuss their organisation.
Take faster student, see if there is a common thread.
Hopefully they will have adopted the plan to pick out all the additions, do those, then the subtractions, etc. etc. thereby only having to adjust their mental set of 4x instead of 75x.
With this in mind get them to now have another go. On the next page is the same exercise - try to see the answers!
Work toward a personal best with the 4 mental set shifts - thinking smarter!!

Page 7, Q 24 For relief, read aloud after being nominated by partner? Humour.

Page 8, Q 25 Background Reading.
In the beginning - before words, language, abstract reasoning, cognitive patterning, and conceptual thinking - were images. The human brain naturally thinks in images. In fact, its capacity to form images or to visualize is one of its most basic mental processes. In the Preface of the classic on visualization, Seeing with the Mind's Eye by Nancy and Mike Samuels the following statement is made: (See worksheet)
So just what are images, and how do they function in our lives?

☐ Images are interior road maps that help us make sense out of life.
☐ They are often unconscious but they control our conscious behavior.
☐ They comprise our pictures of ourselves and our world.
☐ They are an inner guidance system that tells us who we are.
☐ And they give us direction in deciding what to do with our lives.

Images are formed and shaped by every experience we have had. And these images in turn shape both our present and future experience!

Example - the red balloon illustrates the slide projector illustration well. In your mind's eye, as vividly as you can, imagine a red balloon.
• Now put the balloon on the ceiling. Put it on the floor. Now bounce it off the wall.
• Change the size of the balloon so that it is larger than before.
Now make it much smaller.
• Change the color of the balloon to red, to green, to blue, to yellow.
Now make it black and white, striped.
• Now change its size so that it can take you for a ride.
Get on the balloon. Where is it taking you?
What are you seeing?
What are your feelings?
Now return.

Let's reflect on what was happening...
• discuss the slide projector quick or the way the mind works.
Q26 Look at the cube puzzle - a gestalt shift visual illusion. Discuss. (continued...)
1. TILE E.
   2. 35% (5% per letter)
      3. letka = 8%
         4. letka = 20%
         5. letka = 35%
   3. 32 x 12 ÷ 4 + 1 = 97

7. floats up with tide
   9. no earth
   10. He is a dwarf & can only reach up so high.
       A clue could be that if she had someone with them
       then they would always go straight up to his/her room
       on the 10th floor.
       (Elevator signs usually start at 1 2 3 4 etc. Could
        only reach up to 7th)

11. ✓
12. ✓

13. 3 socks - Of any 3 socks taken out of the
    rucksack, 2 must be the same colour.

14. ✓
15. ✓
16. ✓

17. Move slowly around the tree, staying just out of the dog's
    reach. You angrily follow your pet dog. He is really
    wending his chain around the tree trunk until it is
    so short he can't possibly reach your car.

18. ✓
19. ✓
20. ✓

21. The Dream

The sacked employee was the warehouse night watchman. He
should have been awake all night on his security duties. Having
a dream proved that he was asleep on the job. For this, he was fired.

Q.22 Mug 50c, String 25c.
Q23 ✓
Q24 ✓
Q25 8 8 8
     8 8
     8
     8

1000 SUNDAY

Q.26 Freda's Fresh Flowers;
    Polly's pretty patterned pillows;
    Tim's tasty tangy tomatoes;
    Walker's weird wrist watches;
    Brown's beautiful bargain books.

Q27 He had already heavily sugared it.

ANSWERS TO CONTRACT SHEETS I —

Q.29 6 6
     6
     6
     6
     6
     6
     6

Q.30 Leave one apple in the basket
Q.31 Father, the mother
Q.32 35 triangles
Q.33 504 - 504 + 504 - 504 - 504
        1
        3
        2
        4
        3

Q.35

Q.36 9567 850
     1085 850
     10652 29786
     31486

Q.37 ✓
Q.38 There are 10 combinations
   
Q.39 Loco push 1 into top section
     then go round push 2 against 1
     Go right around & pull 2 into place
     Then right around & pull 1 into place
     Continue on-end back at start.

Q.40

1 7 14 2 5

9 4 12 8 3

1 1 10

2 6

Q.41 12 days - really 4 x the size - sue writing.
Question 40.

Pick out the picture that is being described, by placing its number in the correct box above (underneath the cartoon it describes).

1. This man is wearing spectacles, is bald and is smiling.
2. This man has curly hair, is wearing a plain tie and has a small, straight nose.
3. This man has straight, black hair, is wearing spectacles and a striped tie.
4. This man is wearing a plain tie, has large ears and is bald.
5. This man has small ears, a curved nose and has curly hair.
6. This man is bald, has a curved nose and is wearing a striped tie.

7. This man has a moustache, is bald and is wearing spectacles.
8. This man has curly hair, is wearing a plain tie, has small ears and is wearing spectacles.
9. This man has straight, black hair, is tieless and has a small, straight nose.
10. This man is bald, has a small, straight nose and small ears. He wears spectacles.
11. This man has a moustache, has curly, black hair and small ears.
12. This man is bald, has a moustache and is smiling.
13. This man has a moustache, is wearing a striped tie and has large ears.
14. This man has curly hair, is wearing a striped tie and is smiling.

(Worksheet 5)

9.44 A painter required three days to paint a room. How long would it take him, working at the same rate, to paint a room twice as long, twice as broad and twice as high?

9.45 Express 100 by using the same figure six times.

9.46 In the puzzle below there is a perfect star shape. Find it, then colour it in.
Q42 99 99 99
Q43 64 + 4 + 4 = 10
Q44
Q45
Q46
Q47
Q48
Q49
Q50
Q51
Q52
Q53
Q54
Q55
Q56
Q57
Q58
Q59
Q60

Q61
Q62
Q63
Q64
Q65
Q66
Q67
Q68
Q69
Q70
Q71
Q72
Q73
Q74
Q75
Q76
Q77
Q78
Q79
Q80
Q81
Q82
Q83
Rule: The number 142, 857 when multiplied by number up to and including 6, will always give an answer containing all 6 of the original figures.

Q84 If the murders were undetected then could be no figure available, since none knew they had taken place.

Q85

Family Party
The party included three children (two girls and a boy), their father and mother, and their father's father and mother. Each of these people can be seen to have the relationship shown:

Q86

The Two Indians
Spring Rain Wind was Happy Hunter's mother.

Q87

The Dream
If the man in the story had really died in his sleep, how did anyone else know what his dream had been about?

Q88 36 - The symbols are merely the numbers 1 2 3 4 5 drawn face to face, as mirror images.
Thus 6 is its mirror image.

Q89 There are 36 rectangles altogether.

Q90 Best yet: "Oop!"
*Now we're both dead meat.*
"Big is not as beautiful."

Q91: Inner circle in 2 + 3 the same.
Outer circle in 2 + inner in 1 the same.
Then is no c) answer.
Jungle Plants

Frequent rain and constant heat, help jungle plants to grow quickly. Plants can grow all year. Trees that grow tall, form a canopy at the top. Here many animals find fruit and food to eat.

Many jungle trees are very useful to man. Some trees, like ebony, teak and mahogany are made into furniture and boats. Often, tree roots (called buttress roots) are so wide and thick that trees have to be sawn higher up on a narrower part of the trunk. Rubber trees which grow in Asian jungles produce a white fluid called latex. This is used to make rubber. Beans from cacao pods are used to make chocolate and cocoa.

Some jungle fruits that man eats, include bananas and pineapples. Oil palm fruits are pressed to make cooking oil.

The pitcher plant, which traps insects, is an unusual jungle plant. Rafflesia is unusual too. It has the largest flower of any plant in the world but has no leaves.

Passion flowers and orchids grow high up on the trunks of some trees, trying to reach the light.

A RESCUE BY GRACE DARLING

Grace Darling, the daughter of the keeper of one of the lighthouses upon the Farne Islands, a dangerous group of rocks off Northumberland, was awakened towards the morning of September 6, 1838 by shrieks of distress. When dawn came, she saw the remains of a ship wrecked upon Longstone Island, the outermost of the group.

Grace awoke her father and urged him to launch his boat and go to the rescue of anyone who might be alive in the stranded vessel. However, because the tide was rising and the wind and the sea were wild, the old man bungled back. Grace was sure that she saw a movement on the wreck, as though living beings were still there. So seizing an oar, she got into the boat, which she was well able to manage. Her father could not let her go alone, and, encouraged by seeing that nine persons were still clinging to the forefront of the ship, they rowed off together in a tremendous sea.

Her father, after many vain attempts, succeeded in landing on the rock, and made his way to the wreck. 20 Meanwhile Grace rowed in the heavy sea, skillfully guiding her little boat, which, but for her clever management, would have been dashed to pieces against the rocks.

One by one, with the utmost care and skill, the 25 survivors were placed in the boat and carried to the lighthouse, where Grace lodged, fed and nursed them for two days before the storm abated enough for communication with the mainland. One of them was a Mrs. Dawson who, while she held her two children of 30 eleven and eight years old in her arms, had seen them buffeted to death by the waves.

From "A Book of Golden Deeds" by Charlotte Yonge

Q2 Student listen to story answer question on sheet.

Then discuss drawn with each other.

Then mark with teacher.

Q3 Notemaking - Skimming.

Student turn over sheet skim reading discussed. What are the clues you look for ie names / dates.

The question is clearly marked - teacher reads it to class. Off the word go they turn over sheets to begin to skim read to find answer. Teacher counts the seconds from the word go. Class writes the seconds they took to then their answer.

Notemaking - discussion.

Work through 1 para. Aim is 1 point per paragraph.

LISTENING SKILLS SHEET 2

1. A beehive is like a house with two storeys. The bottom part is the brood chamber. This is where the queen bee lays her eggs. The top part is called the super. Honey is made and stored here.

Then student fill in words.

2. In the Sahara Desert, very little rain falls. It is very hot. This makes it hard for plants to grow. Because there are few trees and plants, there are no roots to hold the earth. Loose earth is easily blown away by strong winds.

3. Water is needed by nearly all forms of life in the world. It is transparent. When water freezes, it turns into ice and can float. The sun's heat can turn water into a vapour, which rises to make clouds.
APPENDIX D

Questionnaire
Problem Solving and Thinking Skills.

Name ____________________________  Instructor  Mr. Wagener
Class ____________________________
Period ____________________________
Date ____________________________

Read the question and circle the numbers 1 to 5 in the space at the end of the question.

5 means all the time  4 means most of the time  3 means half of the time  2 means some of the time  1 means not at all

1. Thinking tools, such as CAF and PMI, make it easier for me to think about the work that I am doing
   5  4  3  2  1
   Are there any comments you wish to make? ____________________________

2. Thinking tools, like CAF and PMI, have made it easier for me to learn
   5  4  3  2  1
   Are there any comments you wish to make? ____________________________

3. Learning about how the brain functions has made it easier for me to understand how I think
   5  4  3  2  1
   Are there any comments you wish to make? ____________________________

4. Learning about how the brain functions has made it easier for me to understand how I learn.
   5  4  3  2  1
   Are there any comments you wish to make? ____________________________

350
5. I use thinking tools, such as CAF and PMI .....

5 4 3 2 1
Are there any comments you wish to make?

6. I use knowledge about how the brain functions .....

5 4 3 2 1
Are there any comments you wish to make?

7. I believe that using thinking tools, such as CAF and PMI, will help me to learn.

5 4 3 2 1
Are there any comments you wish to make?

8. I believe that using thinking tools, such as CAF and PMI, will help me to think.

5 4 3 2 1
Are there any comments you wish to make?

9. I believe that understanding how the brain functions will help me to learn.

5 4 3 2 1
Are there any comments you wish to make?

10. I believe that understanding how the brain functions will help me to think.

5 4 3 2 1
Are there any comments you wish to make?
Students' Comments Written on Questionnaire
Students' written responses on the questionnaire

9.1.1

Question 1: (Thinking tools, such as CAF and PMI, make it easier for me to think about the work that I am doing).

Student 1. We only done these three or four times but yes it does help me a little bit with the work that I am doing.

Student 2. I mostly use CAF in tests.

Student 5. When we take time to learn I learn things better.

Student 6. It makes it understandable.

Student 7. I forget about it all the time. I wish I could remember to use it because I think it would help me.

Student 12. Thinking tools such as CAF and PMI make me think harder about work.

Student 13. CAF helps when doing debates or writing essays.

Student 14. CAF and PMI help to break down the problem making it easier to answer.

Student 16. I haven't really needed to think using these skills - As it's just a common way I think anyway.

Student 17. Sometimes they do and other times I completely forgot about them.

Student 18. Yes, I don't remember it when I am in other classes.

9.1.2

Question 2: (Thinking tools, like CAF and PMI, have made it easier for me to learn).

Student 1. Yes, a bit.
Student 3. Yes, it's made easier and more fun.

Student 5. I only really use them when I am stuck.

Student 7. It does help when you think you can't do it. You remember the rules and get going again.

Student 9. It is easier to consider all factors.

Student 13. They made it easier because I thought harder.

Student 14. In debates its easier to understand what the debate is about.

Student 15. It teaches you to understand the problem better.

Student 17. These factors don't make it easier to learn in some subjects.

Student 18. No not really - well a little bit.

Student 19. No, I don't think about it in class.

9.1.3

Question 5: (I use thinking tools, such as CAF and PMI...).

Student 2. All the time

Student 9. It is easier to learn.

Student 11. I use them to work out problems.

Student 13. I use CAF and PMI a lot because I believe they help me to learn things.

Student 14. Usually only in English. It helps me to decide if I am against the topic or not in debating.

Student 16. They help me to work out problems.
9.1.4

Question 7: (I believe that using thinking tools, such as CAF and PMI, will help me to learn).

Student 13. I believe that using the thinking skills helps me to learn.

Student 14. I will understand things better using CAF and PMI then I will learn more easily.

Student 15. It makes things easier.

Student 19. No, when I start to use it maybe it might help me.

9.1.5

Question 8: (I believe that using thinking tools, such as CAF and PMI, will help me to think).

Student 5. It will only make me think better than usually.

Student 10. I am an individual and have my own thoughts.

Student 13. I believe that using the thinking tools helps me to think a bit better and they help me a lot.

Student 20. Maybe if I understood them a little more.

Thirty-eight students made a comment on the questionnaire related to aspects of metacognition:

9.1.6

Question 3: (Learning about how the brain functions has made it easier for me to understand how I think).

Student 137. Well a bit, but I don't really do this type of work in my other classes.
Student 43. It gave me an insight to things I did not know.

Student 110. Sometimes you know why you can't remember, that's why knowing about the brain helps.

Student 119. I can understand a bit easier how the brain works and the connections. I still can't understand some parts but I still understand most of it.

Student 159. It was just very interesting to know about the brain.

Student 76. Learning about the brain has made me think about how the brain works.

Student 17. Learning more about my brain and how it works was very interesting and made it easier to understand how I think.

Student 11. No, it just makes me more brighter because I know about the brain.

Student 53. It has taught me about a part of my body I didn't fully understand.

Student 20. Yes I try to use PMI and CAF when I can remember but knowing about the brain works more.

Student 22. It has helped me in a way I suppose as now I try to use more of my brain.

Student 173. Yes, because there still was some things I haven't learnt.

Student 171. It made it easier for me to learn because I didn't know how the brain worked.

Student 128. Yes it helped me to know how the brain works.

Student 114. I think it should continue throughout the years for Year 7.

Student 87. The brain is too hard to understand. Only if you want to be a brain surgeon should you have to learn about it.
Student 50. It depends.

Student 41. I don't really think learning about the brain will help in some subjects.

Student 37. Because I can try to use more of my brain.

Student 36. It hasn't really. It was sort of boring.

Student 4. Learning about the brain hasn't learnt me to think because you can't change how your body operates.

Student 23. I learnt a lot about the brain in these lessons.

9.1.7

Question 4: (Learning about how the brain functions has made it easier for me to understand how I learn).

Student 43. It makes me work harder to get the other part of my brain to work.

Student 17. Learning how the brain functions has made it easier for me to learn because I understand how my brain works a bit better than before.

Student 19. This teaches you what parts of the brain do so that you understand it better.

Student 45. In some way I guess it helps.

Student 176. Sometimes it helps me to learn.

Student 131. Most times it made me understand more about nerves and the messages that the brain sends.

Student 130. Sometimes it has and sometimes it hasn't.

Student 42. I have thought about it. I have thought about how to use more than 20% of my brain.
9.1.8

Question 6: (I use knowledge about how the brain functions...).

Student 48. Only in Health.

Student 50. Sometimes in Health.

Student 45. Yes. In subjects and at home.

Student 47. Mainly in Health.

Student 11. I use it in Health.

Student 17. I use knowledge about the brain functions because it is interesting and helps me to learn more.

9.1.9

Question 9: (I believe that understanding how the brain functions will help me to learn).

Student 17. Understanding the brain functions was interesting and it helped me to learn some things.

Student 5. What has it got to do with knowing how to do a long division?

Student 47. Only in Health.

Student 18. I don’t see how understanding how the brain functions can make it any easier to learn.

Student 45. Yeah. It has started already.

Student 21. I don’t think it has anything to do with it.

Student 50. I don’t really think about it.

Question 10: (I believe that understanding how the brain functions will help me to think).

Student 17. I believe that understanding how the brain functions has helped me a lot.

Student 5. I'm my own person.

Student 45. Kind of, but learning and thinking are different so I would think that the best for me would be thinking.

Student 131. Sometimes, I hope.

Student 23. Yes, this is true.
APPENDIX F

Transcript of Interviews
Student responses at interview

9.2.1

Interview 1.

Q.1: student response: S1

No, because I was away a lot and only picked up pieces of what it was all about. The book was good, it really made me think a lot about a lot of different things. (S1 denotes the response for the first student response randomly selected for inclusion.)

Q.2: S1

I can recall the very first ones we did, that was PMI and CAF. I thought they were good. Another one that I can remember is FIP and there was OPV. But I can't remember some of the others even though I was in some of the classes.

These strategies stand out because they make me think and I remember to use them. They were also very interesting when we were doing them in class. I hadn't heard of them before so I guess they were also pretty new.

Q.3: S1

I'm not sure, but I guess it has. Not so much in Maths but in other subjects were you have to take more than one point of view. In Maths you just have to get the right answer so it doesn't matter if you consider all the other ways because there is usually just one way.

Q.4: S1

I use CAF and PMI a lot and sometimes the other ones I told you about. I think they make sure that you are on the right track and not just taking one point of view. I use them in most lessons, except Maths, but not all the time. There are some times when you just don't need to use them. It can depend on the type of lesson.

Q.5: S1

Sometimes, it really depends. I don't go around thinking to myself I'd better use a CAF now so I can work this out. Most times If I have a problem and I can't see it easy I will think about using a CAF to help me. It is really hard to say when it is going to happen but when it is important I know I can use it to help me.
Q.6: S1 Yes, I think they have. There's been sometimes when it really did help and other times when it only helped a little bit. Overall, I would say yes.

9.2.2

Q.1: S2 Yes, because I learnt how to use CAF and PMI and they are supposed to help you think through problems. When I use them they have helped me to think about things that I would not have considered, so yes, they have helped me to think.

Q.2: S2 I can recall CAF and PMI, they were the first I learnt to use, but I can also remember C&S, AGO, FIP, OPV and there were some others that I would remember if I thought about it some more. The CAF and PMI stand out because they are the easiest to remember and because I have used them a lot.

Q.3: S2 I think so, because I seem to be able to solve problems in most subjects easier when I use them. It makes me think and start work not just sit around and wait for the answer. They have helped me to get better organised about how I go about the work that I am doing.

Q.4: S2 Yes, I use the strategies quite a bit when I think about it. Sometimes I forget to use them and I have problems then I remember to use them and I start work because I feel I can do it. I mainly use CAF and PMI but sometimes I use one of the others if I think that it will work better. I use them in most lessons when I remember. Sometimes, they even help in Maths. I guess it's because they were the first ones and I got to know them quick.

Q.5: S2 If I remember to use them, then I do.

Q.6: S2 Yes, I think they have helped. I feel that I can do my work better and get more things right when I use them. My answers are different too, they have more stuff in them than what I used to say. So I think they have been a good help making me think.
Q.1: S3  
I think it has helped me to think more about things. Like when something seems too hard to do then you can think of another way to do it.

Q.2: S3  
I can remember PMI, OPV, RULES, CAF and another one to do with making a plan. I think it was called planning, but I know what it was about and that was to plan what you were going to do before. Like picking the best skills to use in working something out. These stand out because they are easy to remember and to use. I can use them all the time because they don't take much to use and think about.

Q.3: S3  
I think it has because I have learnt to use things that I didn't know how to use before. Things seem to be easier when you use some of the ideas so that must be a help.

Q.4: S3  
Yes, I use as many of the strategies that I can think about because some are better to use that others. So it all depends on which is the best to use at the time.

Q.5: S3  
Sometimes I use them outside the classroom but not that often. I told my parents about them and they said we should use them at home and sometimes we do. It helps to solve some problems.

Q.6: S3  
I think they have helped me because they are something I didn't have before and it has helped me to look at things differently and sometimes even makes things easier to understand.

Q.1: S4  
It has helped me to think by using more words and to learn you need words. It helps you to learn more things about what I am talking about.

Q.2: S4  
CAF is the one that I use when I think about it. I use it because it is easy to remember and sometimes helps to work things out.

Q.3: S4  
Sometimes it has and sometimes it hasn't. It helps sometimes when your stuck and need more ways
to do something but sometimes when you have more ways it only makes it harder to find the right one.

Q.4: S4

Sometimes, when you can't work it out. I tried in Maths but it takes too long to get the answer. If you don't want the answer really quick then you have the time to think about other things. I mainly only use CAF because I don't remember some of the others, but that doesn't matter as long as you think as much as you can then it should be alright. I don't think it works good in Maths because you have to get the right answer the right way and there is usually only one way to do it.

Q.5: S4

Yes, I used it in the playground. A couple of the kids were arguing and couldn't agree. They were in my class so they knew what I meant when I said that they should change their thinking and consider other people's opinion. It seemed to work because they stopped arguing.

Q.6: S4

I think so. Sometimes it gives you a different look at things and helps to see things in a number of ways. This seems to improve the way I think in most cases.

9.2.5

Q.1: S5

It has not helped me at all and I don't think it will help me. When I think I don't think about anything, nothing comes into my mind, so it doesn't help me at all.

Q.2: S5

I don't remember any of them. I don't use them. I really don't think they are any good in helping you how to think. You can either think or you can't. Some words aren't going to make you think any better.

Q.3: S5

No, I don't use them so how can they help me.

Q.4: S5

No. Because I don't think they would work.

Q.5: S5

No.

Q.6: S5

No. Because I don't think some words are going to make you think any better. If you can think then
you can think. If you can't you have to try harder or leave school.

9.2.6

Q.1: S6

There are times when it has helped me and there are times when it hasn't. It really depends on what is happening, sometimes you just have to think without really thinking about it, and other times you have time to think and make your mind up. So it depends on what is happening.

Q.2: S6

I can use a lot of them when I think about them. Let's see, there's OPV, PMI, CAF, FIP, and there are still some more, like YES, NO and PO, which was a real strange one. I know I haven't said them all but I will remember them later. I do use them though, well a lot of the time, not all the time.

Q.3: S6

I think so, because when I didn't know what they were and didn't use them I don't think I thought as much about all the different ways of doing something or thinking about something, so I guess it has helped me because know I like to think about things for a little while, and sometimes this can be really good.

Q.4: S6

Yes, I usually use some of the ones I told you about. Some are better in some lessons than in others. Like in English it doesn't matter which one you use because they all give you a chance to think more about the thing that you are doing. In Health CAF is good and I sometimes try to use them in Maths especially when I am stuck and need to get going again. I think I use them because they are easy to remember and make you think.

Q.5: S6

I talk to my Mum about them and she said it seems like a good idea. Anything that can help me with my school work is worth it. But I don't use them that much because I forget about them outside school.

Q.6: S6

Probably they have because I think differently a lot of the time now when I have time to think. I take my time and like to look at a whole lot of things. Before I just gave the answer I thought was best without thinking whether it was or not.
9.2.7
Q.1: S7 Not really. I don't remember much about them after the class. So I don't think they would help me to think.

Q.2: S7 I don't know any of them. I forgot about them. You will have to tell me some to see if I can remember them.

Q.3: S7 I think I can remember learning about CAF and PMI but I don't remember what they stand for. No, I don't think they have helped me to learn because I can't remember about them.

Q.4: S7 No, I don't use them because I have forgotten about them.

Q.5: S7 No.

Q.6: S7 No, they haven't helped me because I can't remember them and don't use them.

9.2.8
Q.1: S8 I'm not sure. I don't really know how to tell. I use them sometimes but I don't know how much help they are in thinking. I think I still think the same way I always have.

Q.2: S8 I can only remember the last ones we did, like YES, NO and PO and PMI and CAF and OPV. I know there were others but I don't think about them as much as these ones. I think I use them because I can remember them and I have used them already sometimes and they were good.

Q.3: S8 I think so, but it is hard to tell because I don't know how to tell. I know that sometimes I use them and it has helped me to work something out and put more stuff in but I don't know yet if they have helped me to learn.

Q.4: S8 Yes, I do use some of them in my lessons. I have used PMI and OPV and some others. Usually it depends on whether I use them or not because it depends on whether I think I need to use them.
Q.5: S8  
Yes, I use them with my homework a lot. They give me time to think and sometimes I come up with better answers. I haven't really used them anywhere else but I probably will.

Q.6: S8  
Yes, they have helped me in class and at home. I think they help because they give you time to think and they keep you going till you have finished.

9.2.9

Q.1: S9  
Yes, it's opened more ideas about the problem and made me look at problems from a wider point of view.

Q.2: S9  
I can recall CAF and PMI because I use them a lot. I also use OPV, AGO, FIP, APC and C&S. I mainly use CAF and PMI because they cover most things and are easy to remember.

Q.3: S9  
Yes, not a lot, in some cases it has but in other cases it has still given me the same picture. But I like using them.

Q.4: S9  
Yes, I use CAF and PMI because I was interested and I listened. I think it would help me to learn in most lessons.

Q.5: S9  
Only sometimes and it depends on the situation. There are sometimes when you remember to use it and there are other times when you don't think about it. So it really depends on who you are with and where you are.

Q.6: S9  
I think it will help me to think better. I think CAF will help me to learn because it is an easy way to learn and it is easy to remember.

9.2.10

Q.1: S10  
Yes, it has helped me because it has helped me to think more deeply into things.

Q.2: S10  
I mainly use CAF and I use it because when you think more deeply you get the right answer almost every time.
Q.3: S10  Yes, using CAF has made me more open minded and knowing all the factors helps me to learn more about it.

Q.4: S10  Yes, I use CAF in most lessons because it is easy to remember and makes me think more about things.

Q.5: S10  No, not really. I don't remember to use it outside the classroom. There does not seem to be as many times.

Q.6: S10  Yes, I think it has. It helps me in problem solving in Maths and it has helped me to get the right answers.

The interview questions on aspects of metacognition were:

1. Has learning about how the brain functions helped you to learn?
2. Has learning about how the brain functions helped you to think?
3. Do you think about your own preferred way of learning?
4. Do you think that an understanding of how you learn will help you - in school? - out of school?
5. What do you think your preferred way of learning is?
6. What is the difference between thinking and learning?

9.3.1

Q.1: S1  Yes, learning about the brain taught me things I didn't know before.

Q.2: S1  No, it hasn't, because you can't really control the mind, so being taught how the brain works doesn't help me think.

Q.3: S1  No, but I think it is interesting that people have a preferred way of learning. I wouldn't know what mine was.
Q.4: S1  Yes, I think it will help in school and out of school. The more that you know the better it will be for you.

Q.5: S1  I don't know.

Q.6: S1  Thinking is a process of the mind which ponders and tries to work things out or remembers things - to recall. Learning is when you take new information into the mind.

9.3.2

Q.1: S2  No, never tried any of the things we learnt.

Q.2: S2  No, I just haven't thought about it.

Q.3: S2  No.

Q.4: S2  In school it will with problem solving and out of school in understanding different people.

Q.5: S2  I don't know.

Q.6: S2  With learning the info goes into long-term-memory. Thinking is using long-term-memory to think of how to do it and then storing it in short-term-memory and later long-term-memory.

9.3.3

Q.1: S3  Yes.

Q.2: S3  Yes, because know you know how your brain works.

Q.3: S3  I think about it, but I don't know how to tell what it is.

Q.4: S3  Yes, I think it would help both in school and out of school. I have told my mum about what it is and she agrees.

Q.5: S3  I don't know but I would like to find out. I will have to think about it.

Q.6: S3  Learning is being told the answer or the question. Thinking is in your head without saying it aloud.
9.3.4

Q.1: S4  Learning about the brain hasn't helped me at all.
Q.2: S4  No, I don't think it has.
Q.3: S4  No, I haven't given it much thought at all. I don't know what it is and I am not sure how to find out.
Q.4: S4  Yes, I do think it will help in school and out of school but I don't think it has helped me yet.
Q.5: S4  I am not sure. I think I like to learn on my own but working with others can be fun. I like Maths a lot, so I guess I prefer that sort of learning.
Q.6: S4  Thinking is concentrating on a subject in your mind. Learning is getting something from outside your mind and entering it in so you understand it, and remember it.

9.3.5

Q.1: S5  Not really. I still go about things the same way I did before I knew all about it.
Q.2: S5  No. Learning about it was fun and interesting but it doesn't help me to think.
Q.3: S5  No, not really. I have not given it much thought at all. I am not sure if it would help me yet anyway. Later, when I have important exams to do then it will help getting me ready.
Q.4: S5  Yes, I think it will help you in school and out of school. I think it will become very important, but I don't think it is real important now.
Q.5: S5  I think I prefer to learn around other people. I like to study with the radio on. I am mostly on the creative side of that diagram you showed us, so maybe, I have to do some work on the other side of me.
Q.6: S5  Thinking is taking information that you already have and extending it. Learning is taking information in.
9.3.6

Q.1: S6 I only learned from that that the brain works and how it does. It didn't really help me with the questions.

Q.2: S6 No, because I already knew about it and I really think it is used in other subjects.

Q.3: S6 No, not really. I don't think about it I just do it.

Q.4: S6 Yes. I think it will help you in school and out of school but I don't think it will help you much in year 7.

Q.5: S6 I don't know.

Q.6: S6 Learning is obtaining information and storing it in the brain and thinking is using the information that you have learnt.

9.3.7

Q.1: S7 No, because it didn't teach me anything.

Q.2: S7 No. I don't think it is of any help at all. Everybody's brain works so how has it helped all of them.

Q.3: S7 No.

Q.4: S7 No to both questions.

Q.5: S7 My preferred style of learning is how I learn now and how I have always been learning and I don't want to change or even think about it, just do it.

Q.6: S7 Learning is discovering new things. Thinking is using what you have learned.

9.3.8

Q.1: S8 No, it hasn't.

Q.2: S8 Not really. Talking about the brain doesn't mean your brain will work.

Q.3: S8 No.
Q.4: S8  Maybe, but that is a long way off and I don’t think about that now.

Q.5: S8  I don’t know.

Q.6: S8  Thinking is to learn about things and learning is to think about things.

9.3.9

Q.1: S9  Yes, a bit, because I have learnt the way the brain works and some things about the brain I didn’t know.

Q.2: S9  Not really, because it was just telling me about how it works and some things about the brain I didn’t know.

Q.3: S9  Sometimes I wonder what it is like so I could use it to be better at school. That is, if it would be able to make me better.

Q.4: S9  Yes, I think it will. I don’t really know why I just think that anything that will help should be of use.

Q.5: S9  I don’t know.

Q.6: S9  I think that the difference is learning is when you know to do something, like a Maths question or something like that and thinking is when you think of something. If that makes any sense.

9.3.10

Q.1: S10  No, because I don’t understand the brain and he don’t understand me.

Q.2: S10  Nope. Not really cause I haven’t learnt anything I didn’t already knew.

Q.3: S10  No.

Q.4: S10  No.

Q.5: S10  I wouldn’t have a clue and I don’t care.

Q.6: S10  Thinking is when you think of an answer or question in which you already know but you just
have to revise it. Learning is when you learn something you didn't know. I have learnt how to fall asleep at night, I just think of all this brain stuff and then I fall asleep from boredom.

9.3.11

Q.1: S11
I'm not sure.

Q.2: S11
Yes. I have tried to balance the way I think. I have tried to work on both sides of the brain.

Q.3: S11
I'm not sure. I probably have but I just don't know it.

Q.4: S11
Yes. I am sure it will and I hope I can remember all the important bits that will help me.

Q.5: S11
I don't know.

Q.6: S11
Learning is when you absorb knowledge and thinking is when you know something and just keep wondering how it happened.

9.3.12

Q.1: S12
Yes. Anything I learn helps me to learn and this is helping me to know more.

Q.2: S12
Yes. It expands my memory to use my brain.

Q.3: S12
No.

Q.4: S12
Yes. I am sure it will. Everything we learn has to help us be better at what we do. I am sure that what I have learned this year will help me at school and at work. Sometimes I think about it so it must be helping me now.

Q.5: S12
I don't know.

Q.6: S12
Learning is something you do over a period of time like studying for a test. Thinking is something you do during the test to revise your learning.
9.3.13

Q.1: S13  
No.

Q.2: S13  
No.

Q.3: S13  
No.

Q.4: S13  
No.

Q.5: S13  
I don't know and I don't think it would matter if I did know.

Q.6: S13  
Learning is being told. Thinking is what you know.

9.3.14

Q.1: S14  
Yes, because I have been getting higher marks.

Q.2: S14  
Yes, because it has helped me in class and at home with problem solving.

Q.3: S14  
No, but I would like to know what it is because I am sure that would help me a lot.

Q.4: S14  
Yes, it already has helped me at school with higher marks and at home with doing my homework and study.

Q.5: S14  
I'm not sure, but I would like to know.

Q.6: S14  
When you think you let stuff out of your brain, when you learn you put stuff into your brain.
APPENDIX G

Chi-square analysis of Questionnaire data for Treatment (N=74) and Control (N=87) by question.
GROUP by Q1

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**Chi-Square**

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Chi-Square

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Minimum Expected Frequency = 3.217
Cells with Expected Frequency < 5 - 2 of 10 (20.0)

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#### Chi-Square

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Minimum Expected Frequency = 11.031

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Number of Missing Observations: 9

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Minimum Expected Frequency - 5.575

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Number of Missing Observations: 9
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#### Chi-Square

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**Chi-Square**

- **Value**: 2.98082
- **DF**: 4
- **Significance**: .56104

- **Likelihood Ratio**: 3.03039
- **DF**: 4
- **Significance**: .55275

- **Linear-by-Linear Association**: .0417
- **DF**: 1
- **Significance**: .35792

**Minimum Expected Frequency**: 3.217

**Cells with Expected Frequency < 5**: 2 of 10 (20.0%)

**Statistic**

- **Value**: .13607
- **ASE**: .13607
- **Approximate Significance**: .56104

**Number of Missing Observations**: 9
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Minimum Expected Frequency = 11.950

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Minimum Expected Frequency = 5.056

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Minimum Expected Frequency: 5.975

Number of Missing Observations: 9
APPENDIX H

The Learning Process Questionnaire
(Biggs, 1987).
Please see print copy for images

John Biggs
Student Approaches to Learning and Studying

Learning Process Questionnaire Manual

John B. Biggs

Australian Council for Educational Research
Melbourne 1987