CRITICAL, CREATIVE, REFLECTIVE AND LOGICAL THINKING IN THE NEMP ASSESSMENTS

A National Education Monitoring Project
Probe Study Report

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May 2005
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1. INTRODUCTION

1.1 BACKGROUND

In 2002, the researcher conducted a probe study concerning student performance across the curriculum in items in the NEMP assessments which tested the essential skills (Knight, 2002). In the section on problem-solving skills (pp 21-22), an attempt was made to classify those items of a problem solving nature according to the kind of thinking required for their successful completion.

The classification of thinking used was that of the New Zealand Curriculum Framework document (Ministry of Education, 1993, p17) which states, among other attributes, that:

*Students will:*

- think critically, creatively, reflectively and logically.

The focus of the study was on student performance and, in particular, on differences in performance between year 4 and year 8 students, and on changes in performance between assessment cycles. Consequently only those tasks which were attempted by both year groups and the trend tasks which were used in two cycles of assessment were considered.

In this study the focus is changed from being purely on student performance to the consideration of the nature of the tasks themselves and also the nature of the marking criteria used to assess student performance on these tasks.

All tasks in the 1996 – 2003 assessments are considered and those which seem to have significant potential for assessing different kinds of thinking are identified. The marking criteria for some of these tasks are then examined to determine the extent to which this potential was realised in the assessment.

It was also hoped that it would be possible to identify some particular items, presented in a one-to-one interview task approach with video tape, which might be used in subsequent studies to explore the nature of the thinking which was actually used by a sample of students in completing the tasks.

1.2 RESEARCH QUESTIONS

1. What is the nature of the tasks in the NEMP assessments which seem to have significant potential to assess students’:
   - critical thinking skills?
   - creative thinking skills?
   - reflective thinking skills?
   - logical thinking skills?

2. To what extent is the potential for assessing these skills realised in the marking criteria for the tasks?
3. What are the similarities and differences between curriculum areas in this regard?

4. Is it possible to identify particular tasks, presented in a one-to-one interview format, the video tapes from which would be likely to enable a researcher, in a subsequent study, to explore the nature of the thinking which was actually used by students?

1.3 THINKING

Many books have been written concerning thinking from philosophical, psychological, and educational points of view and it is not necessary, or appropriate, to consider the concept in too much depth in a report such as this. However, it is important to establish in a broad sense how the researcher is interpreting the concepts of critical thinking, creative thinking, reflective thinking, and logical thinking in this research.

Halpern (2003, page 356) expresses this kind of approach as giving a ‘working definition’. She writes:

“When an abstract concept, like critical thinking, is operationalized, the researcher or evaluator provides a ‘working definition’ or, perhaps more accurately, a ‘definition that works’ so that observers can reliably identify the construct.”

It is clear to the researcher that in an educational context we are interested in thinking which is directed to a purpose. Ruggerio (2004, page 4) provides a useful working definition of such thinking:

“Thinking is any mental activity that helps formulate or solve a problem, make a decision, or fulfil a desire to understand.”

With such a definition it is not difficult to see why thinking is at the very core of education.

When it comes to identifying different kinds of educational thinking, the literature includes many different classifications, and the terms critical, creative, reflective and logical are used in a number of ways. Halpern (2003, Page 357), for example, writes:

“For the purposes of this chapter, critical thinking skills (or strategies) are those that increase the probability of a desirable outcome (e.g. making a good decision, reaching a sound conclusion, successfully solving a problem).”

This is, of course, very similar to Ruggerio’s definition of thinking in general and would, it seems, include creative, reflective and logical thinking. It is reasonable to assume that this was not the intention of the New Zealand Curriculum Framework and that, for this research, we need a working definition of each kind of thinking which will enable us to distinguish between them.

Briefly, in this research:
Critical thinking is thinking which involves evaluation and, perhaps, challenge.

Creative thinking is directed towards solving a problem in one’s own way. It often involves imagination and initiative.

Reflective thinking involves looking back on one’s previous thinking, knowledge and understanding.

Logical thinking is directed towards making deductions or presenting arguments.

These, of course, are not entirely independent. A given task may well involve more than one kind of thinking. In fact it seems likely that all thinking tasks begin with reflective thinking. However, the researcher did not find it difficult to identify tasks for which seemed to involve each of the kinds of thinking in a relatively major way. All the tasks which were classified are reported in later sections of this report.

1.4 ASSESSING THINKING

Assessing thinking is obviously problematic since we do not have access to the thinking itself but only to the result of that thinking and, perhaps, to the student’s report of the processes used. However, it does seem that the NEMP assessments, particularly those which involve video taped interviews, have the potential to assess thinking.

This view is supported by Halpern (2003, page 361) who writes:

“My own preference for test format, when the goal is to assess critical thinking, is to use an ecologically valid example with an open-ended response format, followed by specific questions that probe the reasoning behind an answer.”

This format is entirely possible in the NEMP assessments in those tasks which use the one-to-one interview task format in which the student works individually with a teacher, with the whole session recorded on videotape. Halpern’s criteria for test format are used later in this report.

1.5 MARKING CRITERIA

The nature of the presentation of the results of the assessments in the NEMP content area reports means that the marking criteria can reasonably be inferred from the published results. Consequently, it was not considered necessary to examine the marking criteria of all tasks. A sample of marking criteria was considered and, apart from a very few examples where some of the information obtained through the marking criteria was not published, the marking criteria categories closely matched the reporting categories.

2. METHODOLOGY

2.1 INTRODUCTION
All of the 711 tasks in the NEMP assessments from 1995 to 2003 were examined to identify tasks, or sub-tasks, which seemed to involve critical, creative, reflective, or logical thinking. 159 tasks were identified.

The marking criteria used to assess student performance on 52 of these tasks were then considered to evaluate the extent to which any potential to evaluate these kinds of thinking was realised in the assessment. The choice of tasks for this part of the research was made to ensure a spread across curriculum areas and thinking types. The relationship between the marking criteria for the tasks and the reporting of student performance was then considered.

Each of the kinds of thinking were then considered in turn, looking for similarities and differences in the tasks, and the assessment, across the curriculum.

The tasks which were presented in a format corresponding to that suggested by Halpern and, consequently having greater potential for assessing thinking were then identified.

Finally consideration was given to the possibility of future research using the video tapes of student responses.

2.2 INTENDED OUTCOME

A better understanding of the place of critical, creative, reflective and logical thinking both in the NEMP assessments and in the classroom.

2.3 USE EXPECTED TO BE MADE OF THE OUTCOMES

(a) The findings may be useful to:
   • NEMP in designing further tasks to assess thinking skills.
   • Teachers who wish to encourage and assess thinking skills in their classrooms.

(b) It is hoped that the report will be followed by further research looking at the video evidence of students attempting some of the tasks.

2.4 ASSESSMENT RESULTS FOR MAORI STUDENTS

The assessments of Maori students reported from 1999 – 2002 used a selection of tasks taken from the general assessments. Consequently, no separate analysis of tasks was necessary. However, the thinking tasks which were in the Maori assessments were recorded and a comparison with the general assessments made.

3. THINKING TASKS IN THE NEMP ASSESSMENTS

3.1 THE DISTRIBUTION OF THINKING TASKS IN THE ASSESSMENTS

3.1.1 General assessments
All of the tasks, except the link tasks, in the 1995 – 2003 general assessments were considered to identify those which had potential to assess the nature of student thinking. The number of tasks within each assessment and the number of tasks identified as requiring each type of thinking are given below.

<table>
<thead>
<tr>
<th>Report</th>
<th>Logical</th>
<th>No of tasks</th>
<th>Critical</th>
<th>Type of thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Critical</td>
</tr>
<tr>
<td>Science 95</td>
<td>5</td>
<td>30</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Art 95</td>
<td>0</td>
<td>10</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>GTM 95</td>
<td>1</td>
<td>27</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Music 96</td>
<td>0</td>
<td>16</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Tech 96</td>
<td>3</td>
<td>15</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Read/Speak 96</td>
<td>2</td>
<td>24</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Info Skills 97</td>
<td>1</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Soc Studies 97</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maths 97</td>
<td>5</td>
<td>44</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Listen/View 98</td>
<td>1</td>
<td>17</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Health/PE 98</td>
<td>0</td>
<td>39</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Writing 98</td>
<td>0</td>
<td>22</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Science 99</td>
<td>1</td>
<td>49</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Art 99</td>
<td>0</td>
<td>9</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>GTM 99</td>
<td>0</td>
<td>33</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Music 00</td>
<td>0</td>
<td>19</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Asp of Tech 00</td>
<td>3</td>
<td>19</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Read/Speak 00</td>
<td>0</td>
<td>25</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Info skills 01</td>
<td>1</td>
<td>23</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Soc Studies 01</td>
<td>1</td>
<td>31</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maths 01</td>
<td>5</td>
<td>66</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
3.1.2 Assessments of Maori students

The 1999 – 2002 assessments of Maori students used a selection of tasks from the general assessments. The overall distribution of thinking tasks within these assessments is given below.

<table>
<thead>
<tr>
<th>Type of thinking</th>
<th>Critical</th>
<th>Creative</th>
<th>Reflective</th>
<th>Logical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>8(5%)</td>
<td>5(3%)</td>
<td>11(7%)</td>
<td>7(4%)</td>
</tr>
<tr>
<td>Total (%)</td>
<td>711</td>
<td>21(3%)</td>
<td>40(6%)</td>
<td>55(8%)</td>
</tr>
</tbody>
</table>

Thinking task total(%) 159(22%)  

3.2 COMMENTS

The tables indicate that there is a good distribution of thinking tasks across the NEMP assessments. As expected, some curriculum areas have a greater focus on a particular thinking skill than others. For example, creative thinking is more evident in Art, Music, and Writing, and logical thinking in Mathematics and Science. Reflective thinking occurs widely across the curriculum.

The distribution of thinking skills in the Maori student assessments is not very different from that of the general assessments.

4. CRITICAL THINKING

4.1 INTRODUCTION

In this section the tasks which were identified as requiring critical thinking and, consequently having the potential to assess this skill, are presented and discussed. The working definition of critical thinking in this research is that it is:

Thinking which involves evaluation and, perhaps, challenge

4.2 THE CRITICAL THINKING TASKS
In the table below the tasks the task judged to require critical thinking skills are identified. The information given is:

- The assessment report
- The location of the item
- If the marking criteria for the item were considered. Indicated by *
- The title of the item
- The year group assessed
- The task approach
- If the item appeared in the assessment of Maori students
- A brief description of the thinking aspect of the item

**Art 1995**

Page 43*  
*Two sculptures*  
Y4/8  
1 - 1  
What do you think these sculptures are about? How do they make you feel?

**Technology 1996**

Page 27*  
*Space game*  
Y4/8  
Team  
Play a game and think about ways to improve it. Think of ideas for making it more fun.

Page 28  
*Coloured sheep*  
Y4  
Team

Page 29  
*Green sheep*  
Y8  
Team  
Think up good points, bad points and interesting points about an idea. Discuss.

**Listening and Viewing 1998**

Page 26*  
*Looking around*  
Y4/8  
1 – 1  
Choose a sign or poster which you think is very good and another which is not very good. Explain why. What could be done to improve the poor one?

**Science 1999**

Page 53*  
*Environmental issues*  
Y4/8  
1 – 1  
Judge the relative importance of seven environmental threats and justify your decisions.

Page 56  
*Vege peelings*  
Y4/8  
1 – 1  
Evaluate and justify different approaches to organic waste disposal.

**Art 1999**

Page 38*  
*Two paintings*  
Y4/8  
1 – 1
Describe and interpret two paintings. Explain differences. Give preference and explain choice.

Graphs, Tables and Maps 1999

Page 19*  
**Best value**  
Y8  
1 – 1  
Choose a brand of battery using a complex table of information. Justify the choice.

Aspects of Technology 2000

Page 22  
**Nut cracker**  
Maori  
Y4/8  
1 – 1  
Describe the features of two different nut crackers and evaluate them. Which is the best? Why?

Page 42*  
**Timber factory**  
Maori  
Y8  
1 – 1  
State the good and bad things about building a factory. Give reasons.

Listening and Viewing 2002

Page 27*  
**It’s good to read**  
Maori  
Y4/8  
1 – 1  
Choose two pictures from 9 to put on a poster. Justify your choice.

Page 35  
**Sweet stall**  
Maori  
Y4/8  
1 – 1  
Find good points and not so good point about a video. What needs to be improved? How could it be improved?

Page 36  
**Weet-bix card**  
Maori  
Y4/8  
1 – 1  
Think critically about an advert. What are the messages? Do you think they are true? Why is the advertiser giving these messages?

Page 38  
**Minties moments**  
Y8  
1 – 1  
Think critically about an advert. What are they telling you? Do you agree? Why do you say that?

Health and Physical Education 2002

Page 46*  
**Options**  
Maori  
Y4/8  
1 – 1  
Think about problems and ways of solving them. Indicate good idea, idea, not sure, to a number of possible solutions. Explain your choice.
Writing 2002

Page 29*  Kids these days...  Y4/8  Independent
Maori
Listen to two viewpoints about teenagers. Which do you agree with? Why?

Page 55  Really good writing  Y4/8  Team
Think of all the things you can which make a really well written story. Identify them in a given story.

Visual Arts 2003

Page 38  Portrait pairs  Y4/8  1 - 1
Identify and explain similarities and differences in styles of painting.

Page 40  Wearable arts  Y4/8  1 – 1
Form and explain a personal response to artists work.

Page 41  George Street  Y4/8  1 – 1
Identify and evaluate relative merits of two artistic depictions of a scene.

4.3  MARKING CRITERIA FOR CRITICAL THINKING TASKS

In this section the marking criteria used in the NEMP assessments are considered for a number of the tasks which were judged to involve critical thinking. The intention is to examine the extent to which the criteria capture the critical thinking aspect of the tasks.
In the table below the tasks selected are given together with those parts of the marking criteria which relate to the critical thinking aspects of the tasks. The coding categories for the responses are also given.

4.3.1  Science

1999
Task:
Page 53  Environmental issues  Y4/8  1 – 1
Judge the relative importance of seven environmental threats and justify your decisions.

Marking Criteria:
R15  Global rating of judgements
very strong
strong
moderate
weak
very weak

Comment:
The other 14 marking criteria are directed to providing an overall view of students’ views on environmental issues. The results of the global rating of students’ judgements were not reported in the assessment report, but do, to some extent, reflect the students’ critical thinking.

4.3.2 Art

1995
Task:
Page 43 Two sculptures Y4/8 1 - 1
What do you think these sculptures are about? How do they make you feel?

Marking Criteria:
Interpretation (naming, why painted this way, similarities / differences, …)
  accounting for detail
  narrative – tells a story
  relevant use of art vocabulary
  fluency of ideas
  backing opinions with reasons
  use of metaphor

slightly developed
moderately developed
highly developed

1999
Task:
Page 38 Two paintings Y4/8 1 – 1
Describe and interpret two paintings. Explain differences. Give preference and explain choice.

Marking Criteria:
R3 Interpretation
  accounting for detail
  narrative – tells a story
  relevant use of art vocabulary
  fluency of ideas
  backing opinions with reasons
  use of metaphor

slightly developed
moderately developed
highly developed

Comment:
These two tasks are very similar although the task presentation was not the same. The evaluative nature of critical thinking is captured in the marking criteria.

4.3.3

Graphs, Tables and Maps

1999
Task:
Page 19  Best value  Y8  1 – 1
Choose a brand of battery using a complex table of information. Justify the choice.

Marking Criteria:
R2  Explanation of choice
   Indicates consideration of ranking batteries for all 4 appliances
   Has used battery data but less thoroughly
   Any other response

Comment:
The marking criteria are too prescriptive to capture the critical thinking behind the student response particularly well.

4.3.4 Technology

1996
Task:
Page 27  Space game  Y4/8  Team
Play a game and think about ways to improve it. Think of ideas for making it more fun.

Marking Criteria:
1.  Quality of ideas selected for making the game more fun.
   Weak  Moderate  Strong

Comment:
It was felt that the critical thinking aspect of the task came from the need to evaluate the game as it was played originally. This was not captured in the marking criteria.

2000
Task:
Page 42  Timber factory  Y8  1 – 1
Maori
State the good and bad things about building a factory. Give reasons.

Marking Criteria:
The marking criteria are directed towards providing an overall picture of student thinking on the issue rather than evaluating the thinking of individual students. The criteria consisted of 18 possible responses to the questions. For example:
Q1 and Q3: Good things about having a new factory:
R1  Creates employment, (directly)
R3  Makes town more lively, interesting

Comment:
The assessment report gives the percentage of students who gave a particular response and the marking criteria do not capture the critical thinking of individual students.

4.3.5 Listening and Viewing

1998
Task:
Page 26  Looking around  Y4/8  1 – 1
Choose a sign or poster which you think is very good and another which is not very good. Explain why. What could be done to improve the poor one?

**Marking Criteria:**

R2  Explanation of features of picture chosen (Q2)
- Ability to pick out features, colour, images, symbolism
  - Clear with multiple ideas
  - Relevant but not fully developed
  - On right track but vague
  - Any other response

R4  Explanation of features of picture chosen (Q4)
- Ability to pick out features for comment, and justify why picture is not very good
  - Clear with multiple ideas
  - Relevant but not fully developed
  - On right track but vague
  - Any other response

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**2002 Task:**

Page 27  It’s good to read  Y4/8  1 – 1

Maori

Choose two pictures from 9 to put on a poster. Justify your choice.

**Marking Criteria:**

R3  Strength of justification for choosing first picture
- Strong
- Moderate
- Weak

R4  Strength of justification for choosing second picture
- Strong
- Moderate
- Weak

R6  Strength of justification for not choosing the picture you would not use
- Strong
- Moderate
- Weak

**Comment:**

The marking criteria of both tasks seem to capture the critical thinking of the students very well.

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**4.3.6 Health and Physical Education**

**2002 Task:**

Page 46  Options  Y4/8  1 – 1

Maori

Think about problems and ways of solving them. Indicate good idea, bad idea, not sure, to a number of possible solutions. Explain your choice.
Marking Criteria:
For each of the 4 problems presented:
   Strength of explanation given
      Strong
      Moderate
      Weak

Comment:
Again, asking students to explain their choices is likely to capture the nature of their critical thinking.

4.3.7 Writing

2002
Task:
Page 29 Kids these days... Y4/8 Independent
Maori
   Listen to two viewpoints about teenagers. Which do you agree with? Why?

Marking Criteria:
R5 Overall, how persuasive are the reasons for the position chosen?
   Strongly persuasive
   Quite strongly persuasive
   Moderately persuasive
   Weakly or not persuasive

Comment:
The criteria are likely to capture the students’ critical thinking.

4.4 COMMENTS

- Tasks involving critical thinking skills were found in 7 of the 12 curriculum assessment areas.

- Art, Technology, and Listening and Viewing contributed the most tasks.

- All of the tasks are evaluative.

- Most of the tasks require students to explain, justify, or discuss their responses and, consequently, have the potential to assess the critical thinking of the students. It was felt that this potential was realised very well in some, but not all, of the marking criteria for the tasks.

- 16(76%) of the 21 tasks used the 1 – 1 interview task approach in which the student works individually with a teacher, the whole session being recorded on videotape. It seems likely that further examination of the videotapes, looking particularly for evidence of critical thinking, would be worthwhile.

- The contexts of the tasks were quite varied. Students were asked to make judgements about:
  - paintings, sculptures
  - posters
games
environmental issues
products
advertisements
social problems
stories

• It seems that a list of tasks of this nature would be a useful teacher resource.

5. CREATIVE THINKING

5.1 INTRODUCTION

In this section the tasks which were identified as requiring creative thinking and, consequently, having the potential to assess this skill are presented and discussed. The working definition of creative thinking in this research is that it is:

Thinking which is directed towards solving a problem in one’s own way. It often involves imagination and initiative.

5.2 THE CREATIVE THINKING TASKS

In the table below the tasks the task judged to require creative thinking skills are identified. The information given is:

• The assessment report
• The location of the item
• If the marking criteria for the item were considered. Indicated by *
• The title of the item
• The year group assessed
• The task approach
• If the item appeared in the assessment of Maori students
• A brief description of the thinking aspect of the item

Science 1995

Page 35* Float or sink Y4/8 1 – 1
Q9. Here is a lump of plasticine. See it sinks. Do you think you can make it float? Show me.

Art 1995

Page 17* Imaginary forest painting Y4/8 Independent
Paint you own imaginary forest after watching a video.

Page 23 Firebird pastel and crayon drawing Y4/8 Independent
Draw a make-believe creature called a firebird. Think about your own ideas and use your imagination.

Page 29 Insect collage Y4 Independent
Page 35 Insect head collage Y8 Independent
Make a make-believe or fantasy collage of an insect. Try to use your papers in interesting ways.

**Music 1996**

Page 13*  
*Animal parade*  
*New Zealand tourism video*  
Y4  
Team  
Watch the video and make up some music to go with it.

Page 14  
*Phone jingles*  
Y4  
1 – 1

Page 15  
*Answer phone*  
Y8  
1 – 1

Watch the video and make up some music to go with the phone message.

Page 24  
*Team machine*  
Y4/8  
Team  
Listen to some music. Make up movements to go with it.

**Technology 1996**

Page 27*  
*Space game*  
Y4/8  
Team  
Play a game and think up ways of making it more fun.

**Reading and Speaking 1996**

Page 50*  
*Nils and Nelli*  
Y4/8  
Team  
Put cards in order to tell a story which is funny or sad or interesting in some way. Tell the story to others.

**Listening and Viewing 1998**

Page 30*  
*Robbers in the night*  
Y4/8  
1 – 1  
Put pictures from a comic into order to make a story. The pictures do not show an end. Try to think of 3 funny or unusual endings.

**Writing 1998**

Page 15  
*My place*  
Y4/8  
Independent  
Write about a place which is special to you.

Page 18  
*Me*  
Y4/8  
Station  
Make up a short poem called ‘Me’.

Page 20*  
*The wishing ring*  
Y4/8  
Independent  
Make up an ending for an incomplete story.

Page 22  
*Santa*  
Y4/8  
Station  
Picture of Santa thinking of something funny. Write in the speech bubble what he could be thinking.

Page 24  
*Birthday story*  
Y4  
Station
Page 26  
*A tale of two donkeys*  
Y8  Station  
Put 4 pictures in order to make a story. Write the story under the pictures.

Page 28  
*The conversation*  
Y8  Team  
Photo of policeman and fireman at a fire. Write a really interesting conversation between them.

Page 34  
*Baby giraffe*  
Y4/8  Independent  
Video of television news report on the birth of a baby giraffe. Write a short newspaper story to go with a picture of the giraffe.

**Art 1999**

Page 14  
*Rainy day – Monotype print*  
Y4/8  Independent  
Create and depict an expressive image.

Page 19  
*Clay model*  
Y4/8  Independent  
Create a person and a creature from clay which interact expressively with each other.

Page 31*  
*Maori  Cave creature*  
Y4/8  Independent  
Draw a picture of a make-believe cave creature from your own ideas and imagination.

**Music 2000**

Page 15  
*Line music*  
Y4/8  Team  
Using voice and instruments, create music to follow a line chart.

Page 16*  
*Radical rhyme*  
Y4/8  Team  
Compose and perform a rap to fit a rhyme.

Page 18  
*Boom Laka Laka Ting*  
Y4/8  Team  
Compose and perform some music to match some words.

Page 30  
*Musical sticks*  
Y4/8  Team  
Make up movements with a stick to match some music.

**Reading and Speaking 2000**

Page 53  
*Maori  The sandwich*  
Y4/8  1 – 1  
Retell a story from a picture book without words. Make it as interesting as possible.

Page 54  
*Puppet play*  
Y4/8  Team  
Plan and present plays using hand puppets.
Page 55  *Talk time*  Y4  Team
Give the most interesting talk you can on a topic presented to you.

Page 56  *Talk topics*  Y8  Team

Page 58*  *Wishing ring*  Y4/8  Team
Make up a good ending to an incomplete story.

**Writing 2002**

Page 14*  *Imagination*  Y4/8  Independent

Maori
Choose a picture and write a short story about it. Use your imagination and your own interesting ideas.

Page 18  *Spots*  Y4/8  Station
Invent appropriate dialogue to fit a picture. What do you think this picture is saying or doing?

Page 23*  *Te Potiki*  Y4/8  Station

Maori
Put 4 pictures in order and tell a story about them.

Page 26  *A better story*  Y4/8  Station

Maori
Write a more exciting start to a story.

Page 28  *Please...!*  Y4/8  Station
Write down what you would say to your parents to persuade them to buy you some thing special for your birthday.

**Visual Arts 2003**

Page 14  *Underwater garden*  Y4/8  Independent
Paint a beautiful, magical underwater garden.

Page 20  *Bird battle*  Y4/8  Independent
Make a picture by cutting, tearing, arranging paper. Show two birds fighting.

Page 25  *Dog walk*  Y4/8  Independent
Make a picture about taking a dog for a walk. Draw it so that it really shows what it would be like to be dragged along by this very excited dog.

**5.3 MARKING CRITERIA FOR CREATIVE THINKING TASKS**
In this section the marking criteria used in the NEMP assessments are considered for a number of the tasks which were judged to involve creative thinking. The intention is to examine the extent to which the criteria capture the creative thinking aspect of the tasks.

In the table below the tasks selected are given together with those parts of the marking criteria which relate to the creative thinking aspects of the tasks. The coding categories for the responses are also given.

### 5.3.1 Science

**1995**

**Task:**
Page 35  *Float or sink*  Y4/8  1 – 1

Q9.  Here is a lump of plasticine. See it sinks. Do you think you can make it float? Show me.

**Marking Criteria:**
- 20 Didn’t float
- Boat/bowl, open upwards
- Boat/bowl, open downwards (trapping air)
- Other

**Comment:**
The marking criteria relate only to the final result without assessing any creative approach to the problem.

### 5.3.2 Art

**1995**

**Task:**
Page 17  *Imaginary forest painting*  Y4/8  Independent

Paint you own imaginary forest after watching a video.

**Marking Criteria:**
Expressiveness
- image relevant to task
- development of mood
- sense of movement, where appropriate (e.g. water)
- originality, avoidance of cliché

<table>
<thead>
<tr>
<th></th>
<th>slightly</th>
<th>moderately</th>
<th>highly</th>
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<tbody>
<tr>
<td>undeveloped</td>
<td>developed</td>
<td>developed</td>
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</table>

**1999**

**Task:**
Page 31  *Cave creature*  Y4/8  Independent

Maori

Draw a picture of a make-believe cave creature from your own ideas and imagination.

**Marking Criteria:**
R1  Expressiveness
- image appropriate to task (ie cave creature)
- strength, vitality and colour
movement / dynamism
imagination / avoidance of cliché

highly developed
moderately developed
slightly developed
under developed

Comment:
The criteria certainly seek to capture the creative nature of the tasks.

5.3.3 Music

1996
Task:
Page 13  Animal parade  Y4  Team
New Zealand tourism video  Y8  Team
Watch the video and make up some music to go with it.

Marking Criteria:
Planned instrumental presentation (last presentation only)
1. Inventiveness: appropriate range / choice of sounds are demonstrated
2. Interpretation: sequence and choice of sounds gives a meaningful representation of the scene (pitch, tempo, volume)
   Weak          Moderate         Strong

2000
Task:
Page 16  Radical rhyme  Y4/8  Team
Compose and perform a rap to fit a rhyme.

Marking Criteria:
Mark the final performance, where each student in turn says their part of the rap.
R1  Beat and rhythm
R2  Expressive performance
   strong
   moderate
   weak
Mark the final performance, with the group singing the rap.
R15  Expressiveness of group performance
   strong
   moderate
   weak

Comment:
The criteria seek to assess the creativity of the group as a whole, but not the creative thinking of the individual students

5.3.4 Technology

1996
Task:
Space game  Y4/8  Team
Play a game and think up ways of making it more fun.

**Marking Criteria:**
1. Quality of ideas selected for making the game more fun
   
   *Weak  Moderate  Strong*

**Comment:**
There is no indication in these criteria of the extent to which creativity was valued in the ideas selected.

### 5.3.5 Reading and Speaking

#### 1996

**Task:**
Page 50  *Nils and Nelli*  Y4/8  Team
Put cards in order to tell a story which is funny or sad or interesting in some way. Tell the story to others.

**Marking Criteria:**
2. Story is imaginative
3. Story is entertaining
   
   *Weak  Moderate  Strong*

#### 2000

**Task:**
Page 58  *Wishing ring*  Y4/8  Team
Make up a good ending to an incomplete story.

**Marking Criteria:**
R1 Creativity and originality
   
   *very creative / original  moderately creative / original  little or no creativity / originality*

**Comment:**
The criteria include aspects which relate directly to creativity but it is the product not the process which is assessed.

### 5.3.6 Listening and Viewing

#### 1998

**Task:**
Page 30  *Robbers in the night*  Y4/8  1 – 1
Put pictures from a comic into order to make a story. The pictures do not show an end. Try to think of 3 funny or unusual endings.

**Marking Criteria:**
R4 Story – creativity (Q2)
   
   *Creative  Creative  Creative  Little – no creativity*
R6 Evidence of creativity in endings (Q3)
   High
   Quite high
   Moderate
   Limited

Comment:
The marking criteria specifically identify creativity.

5.3.7 Writing

1998
Task:
Page 20 The wishing ring Y4/8 Independent
Make up an ending for an incomplete story.

Marking Criteria:
R3 Creativity (ideas, originality)
   Highly creative, variety of ideas
   Good level of creativity
   Some creative effort made
   Low level of creativity, originality

2002
Task:
Page 14 Imagination Y4/8 Independent
Maori
Choose a picture and write a short story about it. Use your imagination
and your own interesting ideas.

Marking Criteria:
R1 Interest and originality – impact, humour, ability to capture and hold reader’s
   attention
   Very high level
   Good level
   Some attempts made
   Little or none

Task:
Page 23 Te Potiki Y4/8 Station
Maori
Put 4 pictures in order and tell a story about them.

Marking Criteria:
R2 How detailed is the story?
   Rich in detail
   Moderate in detail
   Minimal in detail

R3 Overall effectiveness in telling a story (entertaining, coherent, satisfactory
   completion, not simply picture captioning)
   High
   Quite high
   Moderate
   Weak
Comment:
The marking criteria for the first two tasks contained specific reference to creativity / imagination but not the third.

5.4 COMMENTS

- Tasks involving creative thinking skills were found in 7 of the 12 curriculum assessment areas.
- Art, Music, Reading and Speaking, and Writing contributed the most tasks.
- All of the tasks involve producing something which is the result of creative thinking. It is the quality of the product which is assessed in the marking criteria.
- None of the tasks require students to explain or discuss the processes used.
- Only 5(13%) of the 40 tasks use a 1 – 1 interview task approach and this will limit the potential for exploring the nature of the thinking involved.
- The contexts of the tasks were quite varied. Students were asked to create:
  - art works
  - music
  - games
  - stories
  - plays
- Again, it seems that a list of tasks of this nature would be a useful teacher resource.

6. REFLECTIVE THINKING

6.1 INTRODUCTION

In this section the tasks which were identified as requiring reflective thinking and, consequently, having the potential to assess this skill are presented and discussed. The working definition of reflective thinking in this research is that it is:

Thinking which involves looking back on one’s previous thinking, knowledge, and understanding.

6.2 THE REFLECTIVE THINKING TASKS

In the table below the tasks the task judged to require reflective thinking skills are identified. The information given is:
- The assessment report
• The location of the item
• If the marking criteria for the item were considered. Indicated by *
• The title of the item
• The year group assessed
• The task approach
• If the item appeared in the assessment of Maori students
• A brief description of the thinking aspect of the item

Science 1995

Page 9*  Separating mixtures  Y4/8  Team
Page 10  Parachutes  Y4/8  Team
Plan an experiment. Talk and think about it

Page 15  Estuary ecology  Y4/8  1 – 1
What is your opinion? If you had to explain your reasons what would you say?

Page 25  Reflections  Y4/8  1 – 1
Think about how you are able to see with your eyes.

Art 1995

Page 43*  Two sculptures  Y4/8  1 - 1
What do you think these sculptures are about? How do they make you feel?

Page 46  Choosing a picture  Y4/8  Team
Choose a picture and give your reasons.

Graphs, Tables and Maps 1995

Page 10*  Car race  Y4/8  Station
What do you notice about the weight of each car and the distance each travelled?

Technology 1996

Page 22  Flag  Y4  Station
What could you do to make the flag better?

Page 23*  Sports bag  Y8  Station
designing
Write down all the things you would need to think about when the sports bag.

Page 24  Planning a class event  Y8  Team
Plan a lunch. Think about all the things you will need to do.

Reading and Speaking 1996
Page 38  *Choosing a book*  Y4/8  Team
Choose a book for the library. Argue your case for the book.

Page 52  *Question time*  Y4/8  Group
Think of interesting questions you could ask two visiting police officers.

Page 53  *Telling an anecdote*  Y4/8  Team
Think about something that happened to you. Tell others about it.

Page 54  *Chit chat*  Y4/8  1 – 1
Tell me about yourself.

Page 56*  *Agree to disagree*  Y4/8  Team
Try to talk others into agreeing with your opinion.

**Information Skills 1997**

Page 14*  *Mary Borg*  Y4/8  1 – 1
Try to think of 3 important things you would want to know about a visitor’s country.

Page 16  *Fire fighters project*  Y4/8  Station
Choose three questions from a list to ask fire fighters to find out about their work.

Page 17  *Project questions*  Y4/8  Station
Write three questions to ask for a project on Samoa.

**Social Studies 1997**

Page 14  *Legends*  Y4/8  1 – 1
Think about the important messages in stories told on video.

Page 19*  *Drinking Fountain*  Y8  1 – 1
tinking
Think about what you could do to persuade the school to put in a fountain.

Page 23  *Roller blades*  Y8  Team
Think of ways to solve a roller blade problem.

**Listening and Viewing 1998**

Page 27*  *Coca Cola*  Y4/8  1 – 1
Two TV commercials. Why are there two? Who would like to watch each? Why might the commercials make them want to buy Coke? Why didn’t the advertisers tell us more about Coke? Which is the best?
Health and Physical Education 1998

Page 15*  *Being healthy*  Y4/8  1 – 1
What is the most important thing on your list of what a person needs to do to be healthy? Why?

Page 16  *It’s great to be fit*  Y4/8  1 – 1
Choose the most important thing about keeping fit. Why?

Page 23  *Smoke free*  Y8  1 – 1
Think about smoking.

Page 28  *A really good friend*  Y4/8  Team
Think about what makes a really good friend.

Page 52  *Keeping safe*  Y4/8  Team
Think about keeping safe on school trips.

Writing 1998

Page 35*  *Bike for Sale*  (advertisement)  Y4/8  Station
Page 36  *Party time*  (invitation)  Y4/8  Station
Page 38  *Fax message*  (reply)  Y4/8  Station
Page 40  *Pen pal*  (letter)  Y4/8  Station
In each case think about the information you would need to give. Write the response.

Science 1999

Page 44*  *Emptying rate*  Y4/8  Team
Plan and conduct an investigation. Discuss the results

Art 1999

Page 42*  *Landscapes*  Y4/8  1 – 1
Match paintings. Explain.

Graphs, Tables and Maps 1999

Page 33*  *North Island / South Island*  Y8  1 – 1
Why do you think the North Island grows faster?

Music 2000

Page 32*  *Two pieces*  Y4/8  1 – 1
Maori
Tell me some things about the music which you thought were specially interesting.

Reading and Speaking 2000
Page 57*  *Special visitor*  Y4/8  Team  
See how many short answer / long answer questions you can think of to ask a visitor.

**Information Skills 2001**

Page 15  *Clown show*  Y4/8  1 – 1  
Maori  
Think of five important pieces of information to put on a poster.

Page 16  *Kiwi questions*  Y4/8  1 – 1  
Maori  
Think of useful questions to ask an expert.

Page 18*  *Funny taste*  Y4/8  Team  
The water tastes funny. Select four people to help. Think of questions to ask them.

**Social Studies 2001**

Page 18  *Tree troubles*  Y8  Team  
Think about a problem. Argue a position.

Page 20  *Group leaders*  Y4/8  1 – 1  
Maori  
What are some of the things a leader should / shouldn’t do to be a good leader?

Page 21*  *A good team member*  Y4/8  1 – 1  
Think about the qualities of good team members.

**Listening and Viewing 2002**

Page 18*  *The wind and the sun*  Y4/8  1 – 1  
Maori  
What does the message in the fable mean?

Page 20  *Drummer Dylan*  Y4/8  1 – 1  
What did the reporter mean?

Page 31  *TV commercials*  Y4/8  1 – 1  
Why do you think the commercial was made in this way?

**Health and Physical Education 2002**

Page 14  *Camp out*  Y4/8  1 – 1  
Maori  
What should people do to be safe.
Page 15*  
**Self-worth**  
Y4/8  1 – 1  
Maori  
Think about positive thinking.

Page 46  
**Options**  
Y4/8  1 – 1  
Maori  
Choose options for dealing with problems.

Page 49  
**Andrew’s school**  
Y4/8  1 – 1  
Maori  
Think about bullying. Suggest solutions. Pick the best. Why?

Page 50  
**Old bones**  
Y4/8  1 – 1  
Maori  
Bereavement. How do you think he is feeling? How could he / you help?

Page 52*  
**Whose friend?** (friendship)  
Y4/8  Station  
Maori

Page 53  
**Winning, A problem** (relationships)  
Maori

Page 54  
**Jump, Jump!** (peer pressure)  
Maori

Page 55  
**Marching boy** (stereotypes)  
Maori  
In each case identify the problem and suggest solutions.

**Visual Arts 2003**

Page 33  
**Warriors and soldiers**  
Y4/8  1 - 1  
Maori  
What story does the sculpture tell you?

**6.3 MARKING CRITERIA FOR REFLECTIVE THINKING TASKS**

In this section the marking criteria used in the NEMP assessments are considered for a number of the tasks which were judged to involve reflective thinking. The intention is to examine the extent to which the criteria capture the reflective thinking aspect of the tasks.

In the table below the tasks selected are given together with those parts of the marking criteria which relate to the reflective thinking aspects of the tasks. The coding categories for the responses are also given.

**6.3.1 Science**

**1995**

**Task:**  
Page 9  
**Separating mixtures**  
Y4/8  Team  
Planning – without knowledge of equipment

**Marking Criteria:**

Planning – without knowledge of equipment  

- Consideration of useful equipment  
  - *Good*  
  - *Moderate*  
  - *Weak*  
  - *Absent*
Qualities of the material discussed  

Good  Moderate  Weak

Absent
Planning – with knowledge of equipment
Discuss uses of equipment in relation to materials  yes / no
Attempts to find a use for all equipment  yes / no
Selectively chooses the pieces of equipment to be used  yes / no

Comment:
The marking criteria do not seem to capture the reflective thinking of the students particularly well.

1999
Task:
Page 44  Emptying rate  Y4/8  Team
Plan and conduct an investigation. Discuss the results

Marking Criteria:
R12  Discussion (related to time for tomato sauce + arguments)
Very good: – good ideas and interpretive skill demonstrated
Moderate: - some good ideas and interpretations, but inconsistent
Poor: - lacking good ideas and interpretive skills

Comment:
Again the marking criteria do not seem to capture the reflective thinking of the students very well.

6.3.2  Art

1995
Task:
Page 43  Two sculptures  Y4/8  1 - 1
What do you think these sculptures are about? How do they make you feel?

Marking Criteria:
Responsiveness (how it makes you feel)
sense of engagement
curiosity
confidence
feelings / empathy

undeveloped  slightly developed  moderately developed  highly developed

Comment:
The criteria seem to capture the reflective thinking nature of the task particularly well.

1999
Task:
Page 42  Landscapes  Y4/8  1 – 1
Match paintings. Explain

**Marking Criteria:**

R7  Similarities between pic1 and pic4
R8  Differences between pics 2 / 7 and pics 9 / 11

- Explains 3 features or elaborates well on 2 or more features
- Explains 2 features
- Explains 1 feature
- Any other response

**Comment:**
The criteria seem to capture the reflective thinking nature of the task reasonably well.

### 6.3.3 Graphs, Tables and Maps

**1995**
**Task:**
Page 10  *Car race*  Y4/8  Station

What do you notice about the weight of each car and the distance each travelled?

**Marking Criteria:**

3.  □  No appropriate comment
    □  Greater weight further distance

**Comment:**
The criteria do not seem to capture the reflective nature of the task. Only the ‘correct’ answer is considered appropriate.

**1999**
**Task:**
Page 33  *North Island / South Island*  Y8  1 – 1

Why do you think the North Island grows faster?

**Marking Criteria:**

R13  Some explanation referring to jobs, weather, etc.

- 2 or more good ideas
- 1 good idea
- anything else

**Comment:**
The criteria do not seem to capture the reflective nature of the task particularly well.

### 6.3.4 Music

**2000**
**Task:**
Page 32  *Two pieces*  Y4/8  1 – 1

Maori

Tell me some things about the music which you thought were specially interesting.

**Marking Criteria:**

R4  Indication of personal response / engagement

- Strong
- Moderate
- Weak
Absent

Comment:
The criteria do seem to capture the reflective nature of the task.

### 6.3.5 Technology

**1996**

**Task:**
Page 23  *Sports bag*  Y8  Station
Write down all the things you would need to think about when designing the sports bag.

**Marking Criteria:**
1. Merit of things to consider
2. Merit of reasoning associated with choice of material(s)
3. Merit of ideas for checking whether the sports bag is going to be good
4. ★ Weak ★ Moderate ★ Strong

Comment:
The criteria do seem to capture the reflective nature of the task.

### 6.3.6 Reading and Speaking

**1996**

**Task:**
Page 56  *Agree to disagree*  Y4/8  Team
Try to talk others into agreeing with your opinion.

**Marking Criteria:**
1. Relevance of ideas to topic.
2. ★ Weak ★ Moderate ★ Strong

Comment:
The criteria do seem to capture the reflective nature of the task.

**2000**

**Task:**
Page 57  *Special visitor*  Y4/8  Team
See how many short answer / long answer questions you can think of to ask a visitor.

**Marking Criteria:**
For each short and long answer question: (up to five questions of each type)
1. Invites extended answer
2. Invites short answer
3. No question
4. ★ R11 ★ Highly appropriate ★ Moderately appropriate ★ Slightly appropriate ★ Not appropriate

Comment:
The criteria do seem to capture the reflective nature of the task.
6.3.7  Information Skills

1997
Task:
Page 14  Mary Borg  Y4/8  1 – 1
Try to think of 3 important things you would want to know about a visitor’s country.

Marking Criteria:
2a  Number of relevant questions
2b  Look at the first three questions only and code the content (there are 6 content categories)

Comment:
Since the quality of the relevant questions is not assessed, the criteria do not capture the reflective nature of the task very well.

2001
Task:
Page 18  Funny taste  Y4/8  Team
The water tastes funny. Select four people to help. Think of questions to ask them.

Marking Criteria:
Selecting people
R4  How many of the people chosen are good choices? (based on child’s argument)
Asking questions
R3-5  Appropriateness of question
R7  Amount of useful information likely to result from set of questions
  High
  Moderate
  Low

Comment:
The criteria do seem to capture the reflective nature of the task.

6.3.8  Social Studies

1997
Task:
Page 19  Drinking Fountain  Y8  1 – 1
Think about what you could do to persuade the school to put in a drinking fountain.

Marking Criteria:
1  Range of distinct ideas
   Several appropriate ideas
   1 – 2 appropriate ideas
   No appropriate ideas
   No response
   Not asked

Comment:
The criteria do seem to capture the reflective nature of the task.

**2001**

**Task:**

Page 21  
*A good team member*  
Y4/8  
1 – 1

Think about the qualities of good team members.

**Marking Criteria:**

R7  Reasons for choice of most important thing. Merit of justification.

*Excellent*  
*Good*  
*Moderate*  
*Poor*

**Comment:**

The criteria do seem to capture the reflective nature of the task.

**6.3.9 Listening and Viewing**

**1998**

**Task:**

Page 27  
*Coca Cola*  
Y4/8  
1 – 1

Two TV commercials. Why are there two? Who would like to watch each? Why might the commercials make them want to buy Coke? Why didn’t the advertisers tell us more about Coke? Which is the best?

**Marking Criteria:**

R1  Why two? Key concept = appealing to different markets to ensure product sales

*Clearly articulates concept with appropriate examples*

*Good ideas but not fully expressed*

*On the right track but vague*

*Any other response*

R2/3  Techniques used in the two commercials

*Expresses a range of relevant ideas and gives appropriate examples*

*Good ideas but not fully expressed*

*On the right track but vague*

*Any other response*

R4  Why the ad didn’t tell us more about Coke

*Well articulated good ideas*

*Some good ideas*

*Any other response*

**Comment:**

Responses to some of the questions in the task were not coded in the marking criteria:

Who do you think would most like to watch the polar bear/pop and rock commercial?

Why do you say that one commercial is better than the other?

However, the criteria seem to capture some of the reflective thinking involved in the task.

**2002**

**Task:**
The wind and the sun

Maori

What does the message in the fable mean?

Marking Criteria:
R24 How well does the student’s explanation of the lesson/main message fit with the words of the message: It is easier to influence people with gentleness than with force.

Very well  Moderately well  Poorly

Comment:
The criteria do seem to capture the reflective nature of the task.

6.3.10  Health and Physical Education

1998

Task:
Page 15  Being healthy  Y4/8  1 – 1

What is the most important thing on your list of what a person needs to do to be healthy? Why?

Marking Criteria:
R11 Why would that be the most important?
Essential for life
Prevention
Mental – emotional wellbeing
Enhancement / Positive body images
Negative repercussions
Other

Comment:
The criteria did not evaluate the responses, only recorded them. Consequently the reflective thinking of the students was not evaluated in this item.

2002

Task:
Page 15  Self-worth  Y4/8  1 – 1

Maori

Think about positive thinking.

Marking Criteria:
What might happen if a person thinks negatively? / positively?
R1/11 Consequences for feelings
R2/12 Consequences for behaviour

Very good insight and awareness
Some understanding
Simplistic awareness / Any other response

Comment:
The criteria seem to capture the reflective thinking nature of the task particularly well.

6.3.11  Writing
1998
Task:
Page 35 Bike for Sale (advertisement) Y4/8 Station
Write a short advertisement. Think about the important information
you will need to give.

Marking Criteria:
R7 Ability to be persuasive
   How effective is the advertisement
      Highly effective
      Moderately effective
      Low level of persuasiveness
      Not effective

Comment:
The criteria do seem to capture the reflective nature of the task.

6.4 COMMENTS

• Tasks involving reflective thinking skills were found in 11 of the 12
  curriculum assessment areas.

• Health and Physical Education contributed the most tasks with the rest spread
  widely over the curriculum areas.

• As one might expect from the general nature of reflective thinking there are a
  very wide range of questions and contexts. In a large number of the tasks the
  student is asked to “think about ….”

• The marking criteria seemed to be capturing the nature of the students’
  reflective thinking quite well.

• 27(49%) of the 55 tasks use a 1 – 1 interview task approach and this indicates
  that many of the tasks have greater potential to assess the nature of the
  thinking used by students.

• Again, it seems that a list of tasks of this nature would be a useful teacher
  resource.

7. LOGICAL THINKING

7.1 INTRODUCTION

In this section the tasks which were identified as requiring logical thinking and,
consequently, having the potential to assess this skill are presented and discussed. The
working definition of logical thinking in this research is that it is:

Thinking which is directed towards making deductions or presenting arguments.

7.2 THE LOGICAL THINKING TASKS
In the table below the tasks the task judged to require logical thinking skills are identified. The information given is:

- The assessment report
- The location of the item
- If the marking criteria for the item were considered. Indicated by *
- The title of the item
- The year group assessed
- The task approach
- If the item appeared in the assessment of Maori students
- A brief description of the thinking aspect of the item

**Science 1995**

<table>
<thead>
<tr>
<th>Page 9</th>
<th>Separating mixtures</th>
<th>Y4/8</th>
<th>Team</th>
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<tr>
<td>Page 10</td>
<td>Parachutes</td>
<td>Y4/8</td>
<td>Team</td>
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<td></td>
<td>Systematically plan an experiment.</td>
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<tr>
<td>Page 16*</td>
<td>Classification</td>
<td>Y8</td>
<td>1 – 1</td>
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<td></td>
<td>Sort cards into groups.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page 28</td>
<td>Batteries</td>
<td>Y4/8</td>
<td>1 – 1</td>
</tr>
<tr>
<td></td>
<td>Conduct an experiment to see which batteries work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page 43</td>
<td>Weather</td>
<td>Y4</td>
<td>Team</td>
</tr>
<tr>
<td></td>
<td>Sort cards into groups</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graphs, Tables and Maps 1995**

| Page 26* | Tuatua School electricity | Y4/8 | Station |
|          | Why do you think that the consumption in that month was lowest? |

**Technology 1996**

| Page 17* | Crane        | Y4/8 | 1 – 1 |
|          | Tell me how it works. |
| Page 18  | Stapler      | Y4   | Station |
|          | Explain the function of each part. |
| Page 21  | Gift shop    | Y4/8 | Station |
|          | Make a package for soaps |

**Reading and Speaking 1996**

| Page 46  | Follow me    | Y4/8 | Team |
|          | Tell others how to perform tasks without showing them. |
| Page 50* | Nils and Nelli | Y4/8 | Team |
|          | Put cards in a suitable order |
Information Skills 1997

Page 35*  Chocolate factory Y4/8 Station
Choose cards to show the main steps in production and put them in order.

Mathematics 1997

Page 18*  Numbers in squares Y4/8 Team
Put numbers in squares to solve a problem.

Page 51  Cut it out Y4/8 Station
Cut folded paper to produce a given pattern.

Page 55  Jumpers Y4/8 1 – 1
Predict the result of number line jumps.

Page 58*  Algebra, statistics and logic items Y4/8 Independent
Complete number patterns. Explain.

Page 59  Number patterns Y4/8 Independent
Write missing numbers in patterns.

Listening and Viewing 1998

Page 30*  Robbers in the night Y4/8 1 - 1
Put pictures in logical order.

Science 1999

Page 32*  Ball bounce Y8 Team
Plan an experiment

Aspects of Technology 2000

Page 15  Puppet make-up Y4/8 1 – 1
Maori Describe how the puppet was made.

Page 16*  Buzzer Y4/8 1 – 1
Design an electric circuit and explain.

Page 17  Peg basket Y4/8 Independent
Explain design features.

Information Skills 2001

Page 37*  Stop-Look-Think Y4/8 1 - 1
Explain what might happen next.
Social Studies 2001

Page 18  
Tree troubles  Y8  Team  
Make a case for cutting/not cutting down a tree.

Mathematics 2001

Page 43  
Hedgehog  Y4/8  1 – 1  
What direction would you give me?

Page 46  
Paper folds  Y4/8  Station  
Maori  
Cut folded paper to produce a given pattern.

Page 55*  
Statistics items B  Y4/8  Independent  
Maori  
Explain to Maria why she is right or wrong.

Page 56  
Farmyard race  Y4  Team  
Page 57*  
Photo line-up  Y8  Team  
Maori  
Arrange cards logically.

Listening and Viewing 2002

Page 21  
Line up  Y4/8  Station  
Maori  
Follow instruction logically.

Page 29  
Santa gets ready  Y4/8  1 – 1  
Order cards logically.

Writing 2002

Page 20  
Opinions  Y4/8  Station  
Maori  
Argue your opinion logically.

Page 23*  
Te Potiki  Y4/8  Station  
Maori  
Put cards in logical order.

Science 2003

Page 21  
Sorting  Y4/8  1 – 1  
Classify objects, giving reasons.

Page 22  
Plants experiment  Y4/8  Team  
Design an experiment.
Page 30  Sun shine  Y4  1 – 1
Explain why the shadow is longer.

Page 31  Swinging marbles  Y8  Station
What happened? Why?

Page 34  Runaway  Y4/8  Team
Plan an experiment.

Page 38  Experimenting with air and water  Y4/8  1 – 1
Explain what happened.

Page 39  What a muddle  Y4  Team
Classify materials.

Page 40  Soak it up  Y8  Team
Design an experiment.

Graphs, Tables and Maps 2003

Page 20  Renting a car  Y8  Station
Give two reasons for your choice of car.

Page 30  Blackbeard’s map  Y4/8  Station
Plan a route.

7.3  MARKING CRITERIA FOR LOGICAL THINKING TASKS

In this section the marking criteria used in the NEMP assessments are considered for a number of the tasks which were judged to involve logical thinking. The intention is to examine the extent to which the criteria capture the logical thinking aspect of the tasks.

In the table below the tasks selected are given together with those parts of the marking criteria which relate to the logical thinking aspects of the tasks. The coding categories for the responses are also given.

7.3.1 Science

1995

Task:
Page 16  Classification  Y8  1 – 1
Sort cards into groups.

Marking Criteria:
Sorted cards into piles  Yes / No
Provided reasons to differentiate between groups  Yes / No
Gave defensible reasons  Yes / No

Comment:
The criteria do not seem to capture the logical nature of the task very well.

1999
Task:  
Page 32  
**Ball bounce**  
Y8  
Team  
Plan an experiment

**Marking Criteria:**
R12  
Predictions and discussion for 6th ball  
Rating for discussion of the probable ranking of the 6th ball, the arguments presented and discussion of results if different from prediction.

*Very Good:*  
good ideas and interpretive skills  
*Moderate:*  
some good ideas and interpretive skills  
*Poor:*  
lacking good ideas and interpretive skills

**Comment:**  
The criteria do seem to capture the logical nature of the task.

---

**7.3.2  Graphs, Tables and Maps**

**1995  
Task:**
Page 26  
**Tuatua School electricity**  
Y4/8  
Station  
Why do you think that the consumption in that month was lowest?

**Marking Criteria:**
3b  
*No reasonable answer*  
*Some relevant BUT some irrelevant information*  
*Referred to graph*  
*Appropriate response*

**Comment:**  
The criteria do not seem to capture the logical nature of the task very well.

---

**7.3.3  Technology**

**1996  
Task:**
Page 17  
**Crane**  
Y4/8  
1 - 1  
Tell me how it works.

**Marking Criteria:**
3  
Why large cog makes the string move more quickly.  
*Clearly explains effect of more teeth on cog*  
*Vague explanation – with some merit*  
*No idea*

**Comment:**  
The criteria do seem to capture the logical nature of the task

---

**2000  
Task:**
Page 16  
**Buzzer**  
Y4/8  
1 – 1  
Design an electric circuit and explain.

**Marking Criteria:**
None of the criteria relate to the explanations which were required in the task.

Comment:
There is presumably some logical thinking behind the design, but the criteria do not seem to capture this well.

### 7.3.4 Reading and Speaking

1996

Task:
Page 50  
**Nils and Nelli**  
Y4/8  
Team  
Put cards in a suitable order

Marking Criteria:
1  
Story links pictures sensibly  
*Weak  Moderate  Strong*

Comment:
The criteria do seem to capture the logical nature of the task.

### 7.3.5 Information Skills

1997

Task:
Page 35  
**Chocolate factory**  
Y4/8  
Station  
Choose cards to show the main steps in production and put them in order.

Marking Criteria:
3  
Has the student chosen the cards which are **not** part of the main steps  
*Yes / No*

5  
Order of remaining cards  
*Look at each letter the student has identified and count the number of places it is from the correct placement of that letter on the template. Total the score.*

Comment:
There is presumably some logical thinking behind the selection, but the criteria do not seem to capture this well.

2001

Task:
Page 37  
**Stop-Look-Think**  
Y4/8  
1 - 1  
Explain what might happen next.

Marking Criteria:
The section asking for an explanation of what might happen next was not marked.

Comment:
The criteria do not seem to capture the logical nature of the task.

### 7.3.6 Mathematics

1997

Task:
Page 18  
**Numbers in squares**  
Y4/8  
Team  
Put numbers in squares to solve a problem.

Marking Criteria:
1ci  
Evidence of a sophisticated strategy  
*Yes / No*
1cii Evidence of a systematic trial and error  
1ciii Random trial and error  
3i Did they suggest a strategy which takes into account the pattern?  
3ii Did they suggest systematically changing one of the numbers?  
3iii Did they suggest randomly changing numbers?  

4 From their work and the strategies they suggest was there:  
- evidence of a systematic plan which took account of the numbers?  
- evidence of a plan which did not take account of the numbers?  
- no evidence of following a plan?  

**Comment:**  
The criteria seem to capture the logical nature of the task particularly well.

**2001**  
**Task:**  
Page 55 *Statistics items B* Y4/8 Independent  
Maori  
Explain to Maria why she is right or wrong.  

**Marking Criteria:**  
R24 Maria is right or wrong  
- Clear explanation that Maria is wrong with diagram  
- Clear explanation that Maria is wrong without a diagram  
- On right line but vague  
- Any other response  

**Comment:**  
The criteria do seem to capture the logical nature of the task.

**2001**  
**Task:**  
Page 57 *Photo line-up* Y8 Team  
Arrange cards logically.  

**Marking Criteria:**  
R9 Strategy group employed  
- Very good  
- Good  
- Moderate  
- Poor  

**Comment:**  
The criteria do seem to capture the logical nature of the task.

**1998**  
**Task:**  
Page 30* *Robbers in the night* Y4/8 1 - 1  
Put pictures in logical order.  

**Marking Criteria:**  
R2 Story – logical order / sense  
- All pictures in logical order  
- Some pictures in logical order  
- No pictures in logical order
Comment:
The criteria do seem to capture the logical nature of the task.

7.3.8 Writing

2002
Task:
Page 23  Te Potiki  Y4/8  Station
Maori
Put cards in logical order.
Marking Criteria:
R1 Has student created a plot / logical flow using the 4 pictures?
   Every picture logically linked in sequence
   One picture not logically linked
   Two pictures not logically linked
   Little or no linking

Comment:
The criteria do seem to capture the logical nature of the task.

7.4 COMMENTS

• Tasks involving logical thinking skills were found in 8 of the 12 curriculum assessment areas.

• Science, Mathematics, and Technology contributed the most tasks.

• Classifying, planning, and explaining were the focus of many of the tasks. The tasks tended not to be open-ended which reduced the potential for the marking criteria to capture the thinking behind the responses.

• 13(30%) of the 43 tasks use a 1 – 1 interview approach and this indicates that a number of the tasks have greater potential to assess the nature of the thinking used by students.

• Again, it seems that a list of tasks of this nature would be a useful teacher resource.

8. THE HALPERN THINKING ASSESSMENT TASKS

8.1 INTRODUCTION

In this section the tasks in the assessments which seem to have the greatest potential for assessing the four different kinds of thinking are discussed.

As stated in section 1.4 of this report, the researcher shares the view of Halpern (2003, page 361) that the type of test format most suited to the assessment of thinking uses:

• an open-ended response format
• specific questions that probe the reasoning behind an answer
There are many tasks in the NEMP assessments which clearly involve one, or more, of the categories of thinking in which we are interested, but which only examine the *results* of that thinking and not the processes through which the student went to achieve those results. That is, they fail to satisfy the second, of Halpern’s criteria.

The only task format which is likely to satisfy both of the criteria is the one-to-one interview format in which the student works individually with a teacher with the whole session recorded on videotape. The team and independent also involve some videotaping, but there is not the same opportunity for probing the student’s reasoning in these formats.

Consequently, the only NEMP tasks which seem to satisfy Halpern’s criteria are those which:

- are in a one-to-one interview format
- are open-ended
- ask for explanations or justifications

For want of a better word such tasks will be referred to as Halpern tasks.

Whether or not the potential of these tasks was realised in the marking and reporting of the tasks is also considered.

### 8.2 THE DISTRIBUTION OF HALPERN THINKING TASKS

The table below indicates:

- the subject area
- the number of tasks judged to involve each of the forms of thinking
- the number of Halpern thinking tasks for each form of thinking
- the total number of thinking tasks and Halpern thinking tasks.
- the number of Halpern thinking tasks in which the potential was realised in the marking and reporting criteria

<table>
<thead>
<tr>
<th>Subject</th>
<th>Logical</th>
<th>Critical</th>
<th>Creative</th>
<th>Reflective</th>
<th>Logical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science 1</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Art 0</td>
<td>5</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>GTM 0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Music 0</td>
<td>0</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tech 2</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Read/Speak 0</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Halpern tasks</th>
<th>Critical</th>
<th>Creative</th>
<th>Reflective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science 1</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Art 0</td>
<td>5</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>GTM 0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Music 0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Tech 2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Read/Speak 0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
The most obvious feature of this table is that although there were a good number of tasks involving creative and logical thinking in the assessments, none of the creative tasks and few of the logical tasks satisfied the Halpern thinking task criteria.

In the creative tasks, only 5 of the 40 tasks used a one-to-one format and the students were not asked to explain or justify their responses in any of these. This is not surprising. From an assessment point of view, it seems reasonable to assume that the creativity of an art work, a piece of music, or a story can be judged by looking at the end result. It would also be impractical and unnecessary to have a teacher observing all the time an art work was being made or a story written. However, in the art assessments, for example, there are some excellent examples of students being asked to think critically and reflectively on the work of others and it does seem that it would be worthwhile to ask them to consider their own creativity in the same way. Perhaps this is not practicable in the NEMP context, but it should certainly be encouraged in the classroom.

The situation is a little different in the logical tasks. 13 of the 43 thinking tasks used the one-to-one format and there is no obvious practical reason why this number could not have been greater. There was some probing of reasoning, but the researcher felt that it was relatively superficial and this is reflected in the fact that only one of the Halpern logical tasks realised its potential. There is, it seems, an unwarranted tendency to assume that if a student achieves the correct answer for a question involving logical thinking then the thinking must have been sound. There is also the fact that the logical thinking tasks tend to be less open-ended than those involving the other kinds of thinking.

In contrast, 16 of the 21 critical thinking tasks used the one-to-one format and many of them made the most of the opportunities for open-ended questions and response probing which this format provides. There is little doubt that this is the area in which the NEMP assessments were most successful in assessing the thinking of students.
In the reflective thinking tasks 26 of the 55 tasks used the one-to-one format and the majority of these were open-ended. However, in a significant number of tasks the responses of students were recorded but not probed.

### 8.4 SUBJECT AREA DIFFERENCES

It is clear from the above table that the distribution of Halpern thinking tasks is not even over the different subject areas. It is important to recognise in interpreting this that the NEMP assessments are not principally designed to monitor thinking skills. If they do this it is likely to be as a by-product of other objectives.

Graphs, Tables and Maps, Reading and Speaking, Information Skills, Social Studies, and Mathematics, which contributed hardly any Halpern tasks, perhaps tend to be less open-ended than other subjects and consequently good thinking assessment tasks are less likely to arise in the usual assessment patterns of these subjects. If thinking is to be successfully assessed in these areas it seems that specific questions might be required.

Because no creative thinking tasks fitted the Halpern criteria, the more creative subjects of Art, Music, Reading and Speaking, and Writing appear strongly on the table of tasks which involve thinking skills but less strongly in the Halpern tasks than they might have done.

Science, Technology, and Listening and Viewing covered a wide range of thinking tasks.

The thinking in Health and Physical Education was principally reflective although in a number of tasks it seemed that the assessment was mostly concerned with the student’s opinion rather than the thinking behind that opinion.

The subject area which stands out most in the table is Art. In the three assessments undertaken, there were 28 assessment tasks in total, 19 of these were judged to require thinking skills. 10 of these were creative thinking tasks, not in the one-to-one format and consequently not included in the Halpern tasks. However, there is little doubt that the creative thinking of these tasks was evident in the work which the students produced, even if the thinking was not probed. Of the other 9 task all were in the Halpern task category. Only logical thinking was missing.

### 8.5 TWO EXAMPLES OF VERY GOOD THINKING ASSESSMENT TASKS

The two tasks which follow are, in the researcher’s opinion, examples of the best thinking assessment tasks in the NEMP assessments. The first is a critical thinking task taken from the 1998 Listening and Viewing assessment.
The second is a reflective thinking task from the 1995 Art assessment.
As explained earlier, none of the creative thinking tasks involved probing the thinking of students and none of the logical thinking tasks stood out as being particularly good.

The first task is clearly evaluative and consequently involves critical thinking. The initial questions are open-ended, there is no ‘correct’ answer. The students are then required to explain and justify their responses and these explanations are evaluated in the marking criteria.
The second task was considered to be predominately a reflective thinking task although there is an evaluative element towards the end. The student is asked to reflect on the sculptures; what they are about; why they are there; how the sculptures make the student feel. These are clearly open-ended questions the responses to which are probed – can you explain why? The responses to these probes are clearly evaluated in the marking criteria under the category of responsiveness.

9. TASKS FOR FUTURE RESEARCH

The final research question for this study was:

Is it possible to identify particular tasks, presented in a one-to-one interview format, the video tapes from which would be likely to enable a researcher, in a subsequent study, to explore the nature of the thinking which was actually used by students.

It does seem that it is possible. The tasks would need to be Halpern tasks as discussed in the previous section and this would preclude the creative thinking tasks. There did not seem to be any obvious candidates in the logical thinking tasks either. However, the responses to a number of the critical and reflective thinking tasks did appear to be worthy of further examination.

The two tasks in section 8.5, for example, would both be suitable. In both cases students were asked to explain or justify their responses. The marking criteria then asked the assessors to classify the explanations:

<table>
<thead>
<tr>
<th>Task</th>
<th>Marking criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking around</td>
<td>Quality of explanation: clear with multiple ideas relevant, not fully on right track but vague very limited</td>
</tr>
<tr>
<td>Two sculptures</td>
<td>Responsiveness (how it makes you feel) sense of engagement curiosity confidence feelings / empathy slightly underdeveloped moderately developed highly developed</td>
</tr>
</tbody>
</table>

A further examination of the video tapes might enable a researcher to focus on the nature of the thinking behind the responses as well as judging their overall quality. There is almost certainly more useful information in the video tapes than was used in the initial assessment.

10. SUMMARY

10.1 INTRODUCTION
The research involved considering all of the tasks in the 1995 – 2003 NEMP assessments to identify those which had the potential to assess critical, creative, reflective or logical thinking. A total of 711 tasks were considered and 159 of these involved one, or more, of these kinds of thinking.

Each of the kinds of thinking were considered separately and the tasks involved are presented and discussed in sections 4 – 7.

The marking criteria for the tasks were then considered to see to what extent the potential to evaluate the different kinds of thinking was realised in the assessments. The nature of these criteria is reflected well in the way the results of the assessment are reported in the subject reports. Consequently, it was decided that it was not necessary to examine the marking criteria for all of the 159 tasks identified. A sample of 52 tasks, selected to represent each type of thinking and a spread across the curriculum was chosen.

The nature of these marking criteria and the extent to which they capture the nature of the thinking involved is also presented in sections 4 – 7.

Most of the marking, and reporting, criteria, while assessing the results of critical, creative, reflective or logical thinking, did not capture the nature of the thinking itself. Consequently, tasks which had the greatest potential for identifying the nature of the thinking were identified using criteria suggested by Halpern (2003, page 361). In the context of the NEMP assessments, this meant using tasks which:

- are in a one-to-one interview format
- are open-ended
- ask for explanations or justifications

These tasks are referred to in this report as Halpern tasks. 29 such tasks were identified. The relationship of these tasks to the different kinds of thinking and to the curriculum areas is discussed in section 8.

Finally, the question as to whether further research into the video tapes of the responses to some of the Halpern tasks would be useful was considered.

10.2 THE THINKING TASKS

Of the 711 tasks considered, 159(22%) were judged to have the potential to assess one, or more of the thinking skills. 3% involved critical thinking, 6% creative thinking, 8% reflective thinking, and 6% logical thinking.

The assessments for Maori students (1999 – 2002) used a selection of tasks from the general assessments. The distribution of thinking tasks is similar to that of the general assessment. There were 164 tasks of which 31(19%) were thinking tasks, 5% critical thinking, 3% creative thinking, 7% reflective thinking, and 4% logical thinking.
10.3 CRITICAL THINKING

The working definition of critical thinking in this report is that it is:

*Thinking which involves evaluation and, perhaps, challenge.*

Tasks involving critical thinking were found in 7 of the 12 curriculum assessment areas with Art, Technology, and Listening and Viewing contributing the most tasks. Most of the tasks require students to explain, justify or discuss their responses. The obvious potential which this presents for assessing the thinking of students was realised very well in some, but not all marking criteria.

10.4 CREATIVE THINKING

The working definition of creative thinking in this report is that it is:

*Thinking which is directed towards solving a problem in one’s own way. It often involves imagination and initiative.*

Tasks involving creative thinking were found in 7 or the 12 curriculum assessment areas with Art, Music, Reading and Speaking, and Writing contributing the most tasks. All of the tasks involve producing something which is the result of creative thinking. None of the tasks require students to explain or discuss the processes used. Consequently, the marking criteria assess the quality of the product of the thinking rather than the thinking itself.

10.5 REFLECTIVE THINKING

The working definition of reflective thinking in this report is that it is:

*Thinking which involves looking back on one’s previous thinking, knowledge, and understanding.*

Reflective thinking tasks were found in 11 of the 12 curriculum assessment areas. Health and Physical Education contributed the most tasks with the rest spread widely over the other curriculum areas. The general nature of reflective thinking means there are a very wide range of questions and contexts. In many of the tasks students are asked to “think about ….” The marking criteria seemed to capture the nature of the students thinking quite well.

10.6 LOGICAL THINKING

The working definition of logical thinking in this report is that it is:

*Thinking which is directed towards making deductions or presenting arguments.*

Logical thinking tasks were found in 8 of the 12 curriculum assessment areas. Science, Mathematics, and Technology contributed the most tasks. Classifying, planning and explaining were the focus of many of the tasks. The tasks tended not to
be open ended which reduced the potential for the marking criteria to capture the thinking behind the responses.

10.7 THE HALPERN TASKS

The Halpern tasks, which had the greatest potential for assessing the thinking of students, were those which:

- are in a one-to-one interview format
- are open-ended
- ask for explanations or justifications

10.7.1 The distribution of Halpern tasks

29 such tasks were identified, 14 involved critical thinking, 11 reflective thinking and 4 logical thinking. None of the creative tasks satisfied the criteria.

In the creative tasks only 5 of the 40 tasks used a one-to-one format and the students were not asked to explain or justify their responses in any of these. There was a tendency for the logical tasks not to be open-ended.

It was felt that the potential to assess the thinking of students was realised to a greater or lesser extent in 21 of the 29 Halpern tasks.

There were marked differences in the distribution of Halpern tasks across the curriculum assessment areas with 7 of the 12 areas contributing none, or only one task. The tasks in a number of assessment areas tend not to be open-ended, and the more creative curriculum areas tended not to use the one-to-one task approach.

The curriculum area which was most successful in assessing student thinking was Art.

10.8 TASKS FOR FUTURE RESEARCH

There did seem to be a number of critical and reflective thinking tasks among the Halpern tasks which might warrant further research, based on the evidence of the video tapes of the students completing the task, into the nature of the thinking involved.

11. CONCLUSIONS

Each of the following conclusions should be read remembering that the NEMP assessments were not principally designed to assess the nature of the thinking of the students.

1. There is a good distribution of tasks involving critical, creative, reflective and logical thinking in the NEMP assessments. The thinking is tested in a very wide range of contexts across the curriculum.
2. It might be worth publishing a list of the best thinking tasks in each category as a resource for teachers.

3. The critical thinking tasks were, perhaps, the most successful in assessing the thinking of students.

4. The creative thinking tasks were very successful in assessing the results of creative thinking, but did not explore the nature of the thinking involved.

5. The reflective thinking tasks seemed to have more potential for assessing student thinking than was realised.

6. The logical thinking tasks tended not to be open-ended which reduced their effectiveness as thinking assessment tools.

7. The marking schemes varied greatly in their effectiveness in capturing the thinking skills of the students.

8. The tasks which showed the most potential for assessing thinking skills were those which:
   • are in a one-to-one interview format
   • are open-ended
   • ask for explanations or justifications
   and for which the marking criteria look at the nature, as well as the result of the thinking by probing the reasons behind a response.

9. Consideration should be given to trying to include some tasks of this nature in all NEMP assessments.

10. Teachers should be encouraged to use tasks of this nature at all levels of teaching and in all curriculum areas.

11. It does seem likely that the video tapes of the student responses to some of the NEMP assessment tasks contain very useful information, not captured by the marking criteria, concerning the nature of the thinking involved. Further research in this area might be very valuable.

11. REFERENCES

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6. Reading andSpeaking 1996
7. Information Skills 1997
8. Social Studies 1997
10. Listening andViewing 1998
12. Writing 1998
14. Art 1999
15. Graphs, Tables andMaps 1999
16. Assessment Results for MaoriStudents, Science; Art; Graphs, Tables andMaps 1999
17. Music 2000
18. Aspects ofTechnology 2000
19. Reading andSpeaking 2000
20. Assessment Results for MaoriStudents, Music; Aspects of Technology; Reading AndSpeaking 2000
22. Social Studies 2001
23. Mathematics 2001
24. Assessment results for Maori Students, Information Skills, SocialStudies; Mathematics 2001
25. Listening andViewing 2002
27. Writing 2002
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