Reach for the Stars: Using Literacy Strategies in the "Pre-search" Phase of the Information Literacy Process

http://english.unitecnology.ac.nz/esolonline/teachers/prof_read/jan_foote/home_e.php

Jan Foote
Jan Foote is Teacher Librarian at Auckland Girls' Grammar School. She previously taught at Otahuhu College.

ABSTRACT

We know that ESOL students in general and Pasifika students in particular do not perform as well as their European counterparts in both literacy and information literacy.

My teacher research study aimed to determine whether the explicit provision of pre-reading material related to the topic, and the scaffolded teaching of questioning and topic definition would enable my ESOL students to achieve greater understanding of what they were doing. I hoped this understanding would enable them to carry out research more independently and with more understanding of the process.

I carried out the investigation during a four-week unit taught to a year 9 class. At the conclusion of the unit, most of the students felt fairly confident about their understanding of the research process and the place of questioning in it.

INTRODUCTION

This research report is the result of an investigation carried out during a four-week unit (see Appendix I) taught to a year 9 class at an urban girls' school. The unit aimed to teach the first three basic processes of the research or information literacy process - defining an inquiry and creating the research questions; locating relevant information; and finally extracting relevant information into a set of meaningful notes which answered the questions.

I designed the unit to give as much time to the process of defining the topic and developing the questions as was given to the looking for and extracting the information. All students were scaffolded through a piece of "pre-search" text about how humans think about and use stars. From this text they were assisted to choose their own topics about any aspect of the stars. During this "pre-search" phase there was explicit teaching about types and levels of questions; about how to use keywords and how to take 'dot and jot ' notes. Students did not begin to look for information until their questions had been checked. I collaborated with Lucy Jansen, Assistant HOD of English, to produce the unit booklet. This unit was to be taught by me first as a trial before extending it to the rest of the year 9 English classes.

The class I taught was an unstreamed, average year 9 class of mixed ability. Reading ages ranged from 15 to 9. Of the 24 girls, 13 were Pacific Island students, 4 identified themselves as Maori, 5 were Pakeha and 2 were Indian. At least half the class spoke another language besides English.

BACKGROUND

What is information literacy?

A definition of information literacy is the ability to" use information meaningfully in all aspects of our lives" (Kulthau 2001). At its simplest, information literacy is the ability to find and use information for a given purpose. The American Library Association defined it in the Final Report of 1989 as the ability "to recognize when information is needed, and to have the ability to locate, evaluate and use effectively the needed information." (ALA 1989).

However, as D.V. Loertscher (1999) shows, a complexity of literacies and skills lie behind this seemingly simple definition. Loertscher begins to enumerate these when he describes an information literate learner as "a student who can think creatively, think critically, investigate in an organised manner, use information responsibly and communicate effectively", (cited in O'Grady 1999).

This leads to the idea of information literacy as something that uses a sequence of literacy, and thinking processes. These processes combine a number of information skills, thinking skills and literacy competencies. The widely used *"Big Six" definition of Eisenberg and Berkowitz* (cited in Loertscher and Woolls 1999) characterise it as a process in which a student defines a task; formulates information seeking strategies; locates and access the resources; uses the information; synthesises it into their own work and then evaluates it. In New Zealand the commonly used Action Leaming model (Gawith 1988) is very similar, breaking the process down into defining the task; formulating key words and search strategies; locating and extracting the information; synthesising it; presenting it and then evaluating the process. Kulthau (2001) sees information literacy as a four step process, beginning with an initiation period where a project is contemplated, moving to a period of selection where a topic is defined, then through a period of exploration where information is sought until finally the last stage of formulation is arrived at where focused information is collected, presented and assessed.

Whatever the model used, the process is remarkably similar. Information literacy involves literacy, thinking, and skills in finding and being discriminating about information.

The skills that students require are the ability to read, and read critically. They have to be able to extract information - to skim and scan for information, and to take notes. Notes from different sources must be combined into an original piece of work. Students must be able to communicate - at the very least orally, but for the most part in logically ordered formal writing. "Research cannot be separated from reading and writing -good reading and writing." (Handy, 1993, p.2).

Research also requires the ability to question, and to question at a high level of thinking. "Research also requires the ability to question, to know what you don't know, to hypothesise and revise according to evidence." (Handy, 1993, p.2).

Information is rarely available in a simple form that directly answers a student's questions. Students have to be able to construct meaning from a variety of sources.

Digital technology and the internet have changed the information environment from one of scarcity to one of unchecked abundance. Students now have to be able to discriminate and verify from unedited websites. In the same way that we can no longer rely on information to be carefully selected and logically ordered, libraries themselves no longer select and organise all the information they contain. Instead they are gateways to a vast network of resources which students must be able to navigate (Kulthau 2001). Students need technical information skills and high literacy skills to be able to do this.
An information literate student is one who is comfortable moving across a number of literacy functions, and one who can think critically at a high level. To be information literate is to be highly literate.

The Importance of Information Literacy

Not being information literate has profound consequences for both individuals and their societies.

Information illiterate people do not know how to access information when they need it. No-one can learn everything they need to know at one learning institution and at one time in their life. To not know how to find out what you need to know effectively locks people into a time-warp and prevents growth and change. "To promote economic independence and quality of existence there is a lifelong need for being informed and up-to -date." (ALA Presidential Committee on Information Literacy 1989).

To not know how to discriminate about information makes one much more vulnerable to "people who have strong political, economic, religious or ideological stances that profoundly influence the nature of the information they present to others." (International Reading Association, 2001). A society in which only some people have access to information and the ability to use it is not one in which resources are spread equally, nor one that is likely to produce a wide representation of all viewpoints. "A continuation of this trend presents an important threat to these societies' long-term stability."
(International Reading Association, 2001) Moreover, the economic capability of a nation has been directly linked to information literacy "the key to competitiveness will be gaining, transforming and generating knowledge... future workplaces will require the full range of multi-literacies - most especially analysis, synthesis, and evaluation of multiple pieces and forms of information." (Kibby, n.d.) So strongly has the International Reading Association felt about this issue that in 2001 it issued a position statement saying policy makers need to "expand definitions of reading to include locating, critically evaluating, using and communicating information in networked information environments such as the Internet." (International Reading Association, 2001).

Information Literacy and ESOL Students in New Zealand

We know that ESOL students in general and Pasifika students in particular do not perform as well as their European counterparts in both literacy and information literacy.

The Progress in International Reading Literacy Study (PIRLS 2002) showed that while the mean for New Zealand year 5 students was significantly higher than the international average, the spread of scores was higher than the spread for students in most other countries. There was a statistically higher proportion of New Zealand students speaking a language other than English in the home in 2001 than there had been in 1990. The 1992 IEA International Literacy Study of 32 countries showed that second language learners in New Zealand at ages 9 to 14 are further behind their native English speaking classmates than L2 learners in any other country in the study. (McCaffrey 1998). Moreover the gap was widening as the children grew older.

These findings are born out by the *National Education Monitoring Project* (NEMP 2001) which explicitly tested information skills at both Year 4 and Year 8. The previous NEMP testing was in 1997 so the same cohort is studied in both Year 4 and Year 8. In both year groups, there was a significantly lower performance for the lowest decile SES (socio-economic) group with students from lower SES groups reporting lower skills in how to search for information and less experience than high decile students (57% to 79%) at using a computer catalogue. There was no evidence that the disparities that were there for the year 4 cohort in 1997 had been corrected by 2001. However, interestingly, in 2001 lower decile students reported greater enjoyment in hunting for information than students from higher deciles. At year 8 there was evidence of a widening gap between the deciles as the high decile group was performing better than the medium as well as the low decile group.
The 2001 NEMP now looks explicitly at Pacific Island students, something that had not happened previously. These results showed that from a sample of 120 extra students at both year groups drawn from schools with at least 15% Pasifika students, year 4 students Pacific Island students scored significantly lower on questioning tasks, and on tasks relating to finding information on the internet, in a book, and from people and community sources. The year 8 Pasifika students scored lower than other students on a task involving extracting information from a poster and card.

The NCEA statistics (see Appendix II) have given us a new opportunity to examine achievement by ethnicity.

In the area of information literacy, Pacific Island and Maori students are consistently out-performed by European and Asian children. This trend is the same across subjects. Even in history where the figures look healthier for Pacific Island students in 1.1 and 1.3, when students are asked to synthesise information in 1.5 78% of Pacific Island students do not achieve. Again, the figures look better in the sciences than in English, but these achievement standards allow "research with direction". Students are often given considerable help in finding information, but significant numbers of Pacific Island students still find it very difficult to extract and synthesise that information. Interestingly, Asian students do not seem to experience the same degree of difficulty.

The classifications 'Asian student', 'Pacific Island student' are not precise. However, it is probably fair to say that in most Pacific Island homes even if English is the only language used it is the first generation that this is so. Macpherson points out, however, that there is considerable variety in the children of Pacific Island migrants in their knowledge and commitment to the language and culture of their parents.(Macpherson 1991, p.145)

Careful consideration needs to be given to possible reasons for these statistics. From these we need to consider ways in which teaching practice can be altered so that some of these results might ultimately be turned around. Altering teaching practice may be of benefit to many non-ESOL students as well.

The research of Kay Hawke and Jan Hill suggests that the most important factor in the educational success of Pacific Island students is the relationship with the teacher. (Hawk, Hill et al 2001). This has also informed my thinking about the approach I have taken to the teaching of information literacy. It is a process in which students need constant support and guidance from the teacher.

It should be noted that while many of the issues appear to be the same for Maori students they are outside the parameters of this research.

SIGNIFICANCE OF THE PROJECT

This project has both local and national significance. It was used as a trial for the year 9 research unit at my school. As a result of this research and its findings, a slightly adapted version of this unit is being used across the year 9 programme. At the same time a year 10 research programme has been developed which emphasises questioning, extraction of information and the synthesising and presentation of that information. These two units of work will feed into a wider Information Literacy Achievement Certificate. It is intended that by the end of Year 10, 90% of the pupils will have achieved this (2005).

Nationally, it is hoped that this research will indicate some ways of increasing the levels of competence in and understanding of information literacy for ESOL students.

PURPOSE

This research seeks to determine whether the explicit provision of pre-reading material related to the topic, and the scaffolded teaching of questioning and topic definition enables students to achieve greater understanding of what they are doing. This understanding may enable them to carry out research more independently and with more understanding of the process.
The questions that this research will seek to answer are:

- Does the provision of teacher-selected pre-search reading material and reading strategies, related to the topic, enable students to clearly identify and think about their own research topic?
- Does the teaching of pre-search question strategies enable students to formulate clear questions for their own research?
- Once the students had established their topic and questions, were they able to carry out their research with more confidence and understanding of the process?

METHODOLOGY

I have used an *Action Research model* of research. The research questions began from immediate concerns in the classroom and have a local and practical focus. They are investigated in a real classroom situation. It is participative, with no distinction made between one of the participants (the teacher) and the researcher. Multiple sources of evidence have been used. Of the five sources of evidence used, three are qualitative. There has been reflection about the findings.

METHODS

The following methods were used -

1. A research log kept throughout the research that provided me with evidence for reflection about the process as it unfolded.
2. A student questionnaire given to all students in the class which asked them to rate different aspects of the research process by degree of difficulty.
3. Observations carried out by my peer tutors (year 12 students attached to the class) as they observed the class trying to initiate their searches for information.
4. A focus group of six students (all ESOL) who provided me with their feedback in response to my questions.
5. Analysis of student results against the assessment criteria given to them.

FINDINGS

The findings are as follows:

1. My own observations from my Research Log showed that the pre-reading and explicit teaching of questioning worked well in the classroom. The students seemed to find the mind-map that broke up the text clarified things for them, and they had no trouble with the "think-back" exercise when they applied questions to paragraphs in the text.

    > 1/8 "We'd managed the mind map from the text well and they seemed to cope with the explicit teaching of questions well. They could all tell a closed question from an open one and could do the "Think Backwards" exercise (when they were asked to give a question as a heading for the paragraph and say whether the question was open or closed)."

    However, the students experienced much more difficulty when they were asked to do mind-maps of the topics they had chosen, and to formulate their own questions.

    > 3-4/8 "Took folders home over the week-end- only 3 kids had successfully formulated questions and 2 of them had done it with me over an interval detention! Decided greater teacher intervention and modeling was called for."

5/8 "In Library. Demonstrated with their own topic mind map on datashow, using astrology as the topic. I showed how to use each heading as a category about what you already know, and gave vocabulary. Seemed to help immensely. Most were then able with support from myself and the peer tutors to start on the TWDs. When they saw they could put what was on the mind map in the first column,(as what they knew) things seemed to fall into place.

They wrote down what they didn't know, then they turned that around and asked what they needed to know. They still needed support with coalescing their questions. Often had lots of little points that needed to be grouped under a broader "open" question. Often a question of language as they didn't quite have the words to frame what they wanted to know."

2. The girls were asked to rank the various components of the information process from 1 (Very easy) to 5 (Very hard). Eighteen students completed the questionnaire (see Appendix III) and the results were put on a spreadsheet (see Appendix IV).

   These results showed that the literacy-based pre-search tasks had helped the students formulate their inquiry. They all ranked reading the information as "very easy" to "ok"; only one student ranked the mind-map as "getting hard", while ten out of the eighteen put both choosing the topic and understanding open and closed questions in the "very easy" category. While very few students ranked any aspect of research as "very hard", a pattern of increasing difficulty was easily identified in the tasks where students were required to think for themselves in a less supported way. Eleven students ranked sorting out what they knew about their topic as "ok" to "getting hard", while ten students put making their own questions in the same category. Nine found creating keywords "ok" to "getting hard", and the precision of recording information also seemed to be more difficult for some students. The highest number of "getting hards" were for finding websites, and three students found evaluating their notes very hard.

3. The peer tutors observations showed that similar difficulties were being experienced by the students. In theory at this point the students had their research questions and their keywords. I asked Gillian and Tee to just record, as best they could, the questions that students asked them in the Library as they were looking for information in one period. Their recordings were as follows
   - What is astrology?
   - What am I supposed to do?
   - How do I make up questions?
   - What's the difference between astrology and astronomy?
   - I need help.
   - What does "inimical" mean?
   - I need more information on my second question.
   - I'm not sure if the Bible has information on my questions

- I've got my information, I just can't find specific information for my questions.
- How do I use this?
- Is there any information about astrology in the encyclopedia book?
- Can I print this picture instead of using the one in the book?
- Do I work on my third question now?

4. Focus Groups interviews (see Appendix V). All the six girls interviewed were ESOL - a mixture of Samoan and Tongan. They were chosen because of their background and because they had returned their consent forms and were willing (for chocolate bar rewards) to participate in the focus interviews at lunchtime. All had completed the unit, but they represented a range of ability from students who gained "Achieved" to students who had gained "Excellence". Students were not asked questions individually but a general question was asked of the group. I recorded the ensuing discussion but did not intervene except to ask the next question. The students were very willing to participate and there was lively discussion in response to each question. They talked to each other as much as they addressed their answers to me.

   On the whole, the girls saw the value of the pre-reading and mind-mapping exercises. Some reservation was expressed at the way the topic was first seen ("it should have been something that everybody knew about like star stars") but the group did agree that "the idea is to choose something that everyone doesn't know about - that's research". Enthusiasm for the mind-mapping was nearly unanimous. They said "it made us pay attention" and "it gave us something to look back at." One student said "it was good like a brainstorm" and another replied "way better than a brainstorm -more organized heaps of topics".

   All agreed that being taught how to question and applying this to their text had been easy. It was new information "didn't know what it meant until it was explained" but it was "easy" -"think-back exercise was easy -just read the first sentence and you know what the question is".

   However, everyone experienced difficulty when it came to creating their own questions for their own topic. "Topic was easy; choosing your own questions was hard." "Didn't know what to ask". "It was hard to ask open enough questions."

   Even more frustration was experienced when they tried to apply their questions to information for which they themselves were independently searching . "Sometimes I got bored and frustrated and angry". "Sometimes the questions didn't match the information you had." "It was hard having to look things up in the library." They were frustrated by the format of information and easily put off "Some books were too fat" or "I couldn't understand some of the words" or "When I searched for how to draw (up) a horoscope I got things to buy."

   Their answers indicated that at least some of them developed strategies to deal with these difficulties. When someone complained about the difficulty of

finding information to match the question another replied "In that case you had to try to think of ways the information matched; take away the stuff that didn't match; take away the extras; be so thorough". Other answers suggested the students were consciously using the mindmaps and keywords from the in-class pre-search work. "(I) used keywords from the mindmap to find the information" and extending this "When I read the information I found more keywords and used them." They found being explicitly taught 'dot and jot' note-taking strategy (see Appendix VI) helped them think about and sort out their information "didn't need to copy as shows you read the information" "doesn't waste time." They also suggested it was a structure that made them think about their information "took ages because you had to pick out the best one." When asked what they thought the research process was, all of the students indicated that questioning and thinking about those questions were the beginning of research. Four of the six answers talked about finding the answers to your question and three could give a comprehensive answer - for example- "topic questions information answers where you got it what sources you used how you got your sources."

5. Student Results

Of the 23 students who did this unit, all but one completed it. The results were as follows:

Not Yet Achieved	1
Achieved	7

- Selected topic through brainstorming
- Questions chosen (open and closed)
- Locates and selects sources
- Takes clear notes
- Records some steps in process
- Parts of process evaluated
- Records the sources

Merit	7

As above but also

- Has all open questions
- Locates, collects and selects a variety of relevant sources
- Takes clear, organized and interesting questions
- Records all steps taken in the process
- Evaluates the process
- Records the sources in an accepted format

Excellence	8

As above but also

- Poses open and evaluative questions

- Locates, collects and selects a wide variety of relevant sources
- Takes clear and interesting notes which are organized coherently in relation to the question
- Records and details the steps taken in the process
- Evaluates the process and makes suggestions (or recommendations)
- Records the sources in an accepted format

Four students gained 'Merit' and wanted 'Excellence'. They looked at the criteria to see why they had not gained that mark. In each case they had completed every criteria except that of the evaluative question - a question that could lead to the formation of a judgement. In every case they wanted to go back and formulate an excellence level question. I allowed them this opportunity, and they achieved 'Excellence' this time.

CONCLUSIONS

1. The provision of teacher-selected pre-search reading materials and reading strategies such as the mind-map certainly helped students to identify and think about their research topic. As one student said "Choosing the topic was easy". The pre-search reading worked very well as a way in to a topic for students. It allowed the selection of very diverse topics from Mariah Carey (pop star) and Tiger Woods (golf star) to astrology, navigation and how myths explain stars. Students were comfortable with choosing a topic that matched their interests and abilities. It also gave sufficient common ground for the teacher to be able to present meaningful whole-class modeling of the process.

   However, the mind-map in itself was not sufficient. It had to be clearly modeled by the teacher. Very clear scaffolding was necessary to direct the students from the mind-map to the TWD grid (Things I know; things I Want to know; keywords I need to Decide where to go). As a result of this, I modified both the mind-map (to explain the categories represent what I now know) and the grid (see Appendix VII). Literacy strategies such as the mind-map and dot and jot note-taking were important, but they were not enough in themselves.

2. The teaching of pre-search questioning strategies did provide students with a framework for formulating their research questions. However, teacher intervention by checkpoint was very important to check students were on the right track. Creating their questions, and finding information which specifically answered these questions, was the most difficult aspect of the process for them. Even once students understood the difference between closed and open questions, language difficulties sometimes hindered them from either formulating the questions widely enough or understanding if the information they'd found answered the question. Continuous support from the teacher was required in this process. The students' results do indicate that they did gain some competency in this skill. They were engaged in the process to the point of wanting to re-do questions to gain a higher grade.

3. While the students knew what their aims were once they had established their topic and questions, they still experienced difficulty and frustration in

searching for information. They had to develop thinking strategies to get around these difficulties, and they had to persist. However, at the conclusion of the unit, most of the students felt fairly confident about their understanding of the research process and the place of questioning in it.

IMPLICATIONS

This piece of action research does bear out my original contention that ESOL students in particular need pre-provided prior knowledge, clear frameworks, explicit skills-based teaching and literacy-based scaffolding, and continuous teacher support to succeed in information literacy.

However, this research suggests that to be fully autonomous learners, students also need to develop the thinking strategies and affective attributes (such as persistence and time management) which will allow them to cope in the relatively uncontrolled environment of information gathering. In the same way that we need to explicitly teach questioning and note-taking, we need to integrate the explicit teaching of thinking strategies into these units. Such strategies need to be developed and modeled by teachers and opportunities for practice offered to students before we subject them to summative assessments.

WHERE TO FROM HERE?

At my school the opportunity now exists for the development of a school-wide approach to the teaching of literacy, thinking and information literacy in an integrated and coherent way. This has arisen because of the school's vision in appointing two learning specialists-one in literacy and thinking skills and another in information literacy. Both of us have been involved in research projects - myself in this research on information literacy and Cheryl Harvey in research about the teaching of thinking. Through these separate research projects about which we have constantly communicated, we have come to see the limitations of pursuing separate programmes when the same learning processes are involved. Therefore we are now considering the next stages in integrating and making explicit the literacy and thinking skills needed to create autonomous, information literate learners across the curriculum.

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Appendix I

Year 9 Research - REACH FOR THE STARS

The scientific study of stars is called astronomy. The first question to ask is what is a star? A star is a huge, shining ball in space that produces a tremendous amount of light and other forms of energy and heat energy. The stars look like twinkling points of light-except for the sun. The sun is a star, and it supplies Earth with light and warmth. The sun looks like a ball because it is much closer to Earth than any other star.

Some stars have large objects revolving around them in an orbit. These are the planets. Earth is a planet of the sun. Planets themselves do not produce light like a star, but they reflect the light of the sun. From Earth, some of the sun's other planets look like stars to us. For example, Venus is sometimes called the Evening Star because it appears early in the night sky.

Stars are grouped in huge structures called galaxies. The sun is in a galaxy called the Milky Way that contains more than 100 billion stars. There are more than 100 billion galaxies in the universe, and the average number of stars per galaxy may be 100 billion. That means there may be more than 10 billion trillion stars in the universe. But if you look at the night sky far from city lights, you can see only about 3,000 of them without using binoculars or a telescope.

Stars, like people, have life cycles-they are born, pass through several phases, and eventually die. Eventually even the sun will die. It will become a red giant, then a white dwarf and then a black dwarf. Other stars will end their lives in different ways. Some will not go through a red giant stage. Instead, they will merely cool to become white dwarfs, then black dwarfs. A small percentage of stars will die in spectacular explosions called supernovae.

While the astronomers have studied stars scientifically using observation, we have not always known about the stars scientifically. People have always tried to understand why certain things happen. For example, they have wanted to know why the sun rises and sets, and why there are other stars in the sky. But in earlier times, people did not have the knowledge to provide scientific answers. They therefore explained natural events in terms of stories about gods, goddesses, and heroes. These stories were called myths. In these stories people used many symbols to help explain the world. The Greeks symbolized the sun as the god Helios driving a flaming chariot across the sky. The Egyptians represented the sun as a boat.

Ancient people saw that certain stars are arranged in patterns shaped like human beings, animals, or common objects. Some of these patterns, called constellations, came to represent figures of mythological characters. For example, the constellation Orion (the Hunter) is named after a hero in a Greek myth. The constellations were important because their position in the sky changed with the seasons. Stars and their position in the sky were very useful. The stories were an important way of identifying them and therefore being able to tell what time of year it was before people had written calendars. For example, the Maori Matariki or New Year is based on the

position of the stars in the winter sky. The position of the stars was very important for navigation (knowing where you were) during long ocean voyages for people who were great sailors, such as the Polynesians or the Vikings.

Another way people look at the stars today is astrology. Astrology is the study of how the sun, moon, planets, and stars are supposedly related to life and events on the earth. It is based on the belief that the heavenly bodies form patterns that can show a person's character or future. Many people throughout the world believe in astrology. These people base important decisions on the advice of an astrologer (a person who tells fortunes by studying the stars). They believe that your star sign is important. Other people declare there is no scientific basis for astrology.

Astrology is different from astronomy. Both developed from the same set of principles more than 2,000 years ago. However, by the 1600s astronomers using telescopes made discoveries that suggested astrology was not the correct way of looking at the stars. As a result, the two fields became widely different in their methods and purpose. Today, astrologers observe the heavenly bodies to understand things that happen on the earth. Astronomers seek scientific knowledge about the various objects in space.

Today there are a number of ways humans can look at stars. We can try to understand stars scientifically, observing them and finding as many facts about them as possible. We can look at them as stories and symbols, finding out how they were viewed and used in the Ancient World. Even today, we talk of famous people as "stars"; many flags and symbols use stars, and poetry and stories are based around the images of stars. We can all have fun reading our "stars" in the astrology column of the paper.

Your task is to choose ONE aspect of how humans relate to stars for your research topic. You are going to work out what you want to find out about this topic and (with a lot of help) find and organise information about it. Choose well and REACH FOR THE STARS

REACH FOR THE STARS -Question Think-Back Exercise The scientific study of stars is called astronomy. The first question to ask is what is a star? A star is a huge, shining ball in space that produces a tremendous amount of light and other forms of energy and heat energy. The stars look like twinkling points of light-except for the sun. The sun is a star, and it supplies Earth with light and warmth. The sun looks like a ball because it is much closer to Earth than any other star.

Question:

Some stars have large objects revolving around them in an orbit. These are the planets. Earth is a planet of the sun. Planets themselves do not produce light like a star, but they reflect the light of the sun. From Earth, some of the sun's other planets

look like stars to us. For example, Venus is sometimes called the Evening Star because it appears early in the night sky.

Question:

Stars are grouped in huge structures called galaxies. The sun is in a galaxy called the Milky Way that contains more than 100 billion stars. There are more than 100 billion galaxies in the universe, and the average number of stars per galaxy may be 100 billion. That means there may be more than 10 billion trillion stars in the universe. But if you look at the night sky far from city lights, you can see only about 3,000 of them without using binoculars or a telescope.

Question:

Stars, like people, have life cycles-they are born, pass through several phases, and eventually die. Eventually even the sun will die. It will become a red giant, then a white dwarf and then a black dwarf. Other stars will end their lives in different ways. Some will not go through a red giant stage. Instead, they will merely cool to become white dwarfs, then black dwarfs. A small percentage of stars will die in spectacular explosions called supernovae.

Question:

While the astronomers have studied stars scientifically using observation, we have not always known about the stars scientifically. People have always tried to understand why certain things happen. For example, they have wanted to know why the sun rises and sets, and why there are other stars in the sky. But in earlier times, people did not have the knowledge to provide scientific answers. They therefore explained natural events in terms of stories about gods, goddesses, and heroes. These stories were called myths. In these stories people used many symbols to help explain the world. The Greeks symbolized the sun as the god Helios driving a flaming chariot across the sky. The Egyptians represented the sun as a boat.

Question:

Ancient people saw that certain stars are arranged in patterns shaped like human beings, animals, or common objects. Some of these patterns, called constellations, came to represent figures of mythological characters. For example, the constellation Orion (the Hunter) is named after a hero in a Greek myth. The constellations were important because their position in the sky changed with the seasons. Stars and their position in the sky were very useful. The stories were an important way of identifying them and therefore being able to tell what time of year it was before people had written calendars. For example, the Maori Matariki or New Year is based on the position of the stars in the winter sky. The position of the stars was very important for navigation (knowing where you were) during long ocean voyages for people who were great sailors, such as the Polynesians or the Vikings.

Question:

Another way people look at the stars today is astrology. Astrology is the study of how the sun, moon, planets, and stars are supposedly related to life and events on the earth. It is based on the belief that the heavenly bodies form patterns that can show a person's character or future. Many people throughout the world believe in astrology. These people base important decisions on the advice of an astrologer (a person who tells fortunes by studying the stars). They believe that your star sign is important. Other people declare there is no scientific basis for astrology.

Question:

Astrology is different from astronomy. Both developed from the same set of principles more than 2,000 years ago. However, by the 1600s astronomers using telescopes made discoveries that suggested astrology was not the correct way of looking at the stars. As a result, the two fields became widely different in their methods and purpose. Today, astrologers observe the heavenly bodies to understand things that happen on the earth. Astronomers seek scientific knowledge about the various objects in space.

Question:

Today there are a number of ways humans can look at stars. We can try to understand stars scientifically, observing them and finding as many facts about them as possible. We can look at them as stories and symbols, finding out how they were viewed and used in the Ancient World. Even today, we talk of famous people as "stars"; many flags and symbols use stars, and poetry and stories are based around the images of stars. We can all have fun reading our "stars" in the astrology column of the paper.

TOPIC:

MAKING UP YOUR QUESTIONS - THINK, WINK, DECIDE

THINK *Things I now know*	**WINK** *What I need to know*	**DECIDE** *Keywords I will use to find information*

REACH FOR THE STARS - MY TOPIC

Appendix II

Table of percentages of students not achieving information literacy-based NCEA Level 1 Achievement and Unit Standards 2002 by ethnicity.

NCEA STANDARD	PERCENTAGE EUROPEAN STUDENTS NOT ACHIEVING	PERCENTAGE ASIAN STUDENTS NOT ACHIEVING	PERCENTAGE MAORI STUDENTS NOT ACHIEVING	PERCENTAGE PACIFIC IS STUDENTS NOT ACHIEVING
ENGLISH ACHIEVEMENT STANDARD 1.9 Research, organize and present information	25.9	21	49.1	47.8
SCIENCE ACHIEVEMENT STANDARD 1.2 Research with direction how science and technology are related	19.2		39.5	36.8
BIOLOGY ACHIEVEMENT STANDARD 1.2 Research with direction how biology and technology are related	24.4	24.9	40.9	38.9
PHYSICS ACHIEVEMENT STANDARD 1.2 Research with direction how Physics and technology are related				37.8
CHEMISTRYACHIEVEMENT STANDARD 1.2 Research with direction how Chemistry and technology are related	12.5	12.7	23.8	20.6
HISTORY ACHIEVEMENT STANDARD 1.1 Carry out an historical investigation				26.3
1.3 Interpret historical sources				28.2
1.5				78.2
TECHNOLOGY ACHIEVEMENT STANDARD 1.7 Describe the interactions between a technological intervention and society	71.8	64.7	86.3	87.4

ENGLISH UNIT STANDARD 8811 Collect information using a range of oral, written and visual sources and methods (Assesses only defining, locating and extraction of information, not presentation).	50.4	47	61.4	53

Appendix III

Research Questionnaire

Show how easy or hard you found each part of the research process by circling a number. The number one (1) means it was very easy; two (2) pretty easy; three (3) OK; four (4) getting hard and five (5) really hard.

1. Reading the information given in class	1 2 3 4 5
2. Doing the mind map from the information given	1 2 3 4 5
3. Choosing your own topic	1 2 3 4 5
4. Doing the mind map of your topic	1 2 3 4 5
6. Sorting out what you didn't know about your topic	1 2 3 4 5
7. Understanding the difference between open and closed questions	1 2 3 4 5
8. Making your own questions about your topic	1 2 3 4 5
9. Knowing what keywords to use to find information	1 2 3 4 5
10. Finding books in the library	1 2 3 4 5
11. Finding web sites on the Internet	1 2 3 4 5
12. Taking dot and jot notes to answer the questions	1 2 3 4 5
13. Recording where your information came from in your booklet	1 2 3 4 5
14. Keeping your Research Log	1 2 3 4 5
15. Evaluating your notes	1 2 3 4 5

Appendix IV

Spreadsheet Of Student Questionnaire Results

	Very easy	Pretty Easy	OK	Getting Hard	Very Hard
Reading information given in class	8	8	2		
Mind map of information	6	8	3	1	
Choosing own topic	10	4	3	1	1
Sorting out what you knew	2	5	10	1	
Understanding open & closed questions	10	4	2	1	1
Making own questions	4	4	8	2	
Keywords	4	5	5	4	
Finding books	8	7	1	2	1
Finding websites	5	3	3	5	1
Dot & jot notes	6	6	2	3	1
Recording information	3	6	6	3	
Keeping research logs	3	5	7	2	1
Evaluating notes	3	8	1	3	3

Appendix V

Focus Group Interview Full Text

MOE Research
Focus Groups 8/9/03
Six girls interviewed

1. Tell me what you thought about the first piece of reading we did in class
    - Interesting because it was about the stars and different ways of thinking about the stars
    - Boring because it was just information
    - Thought it was Science not English
    - It should have been something that everybody knew about like star stars
    - But the idea is to choose something that everyone doesn't know about that's research
    - Autobiography would be better

2. Tell me what you thought about doing the mind maps
    - Good I like that
    - Gave us something to look back at
    - Made us pay attention
    - Didn't make sense - had your topic and then little topics and then semi-topics
    - It was good like a brainstorm
    - Way better than brainstorms -more organised heaps of topics

3. Tell me what you thought about learning about different types of questions
    - Easy
    - Didn't know what it meant until it was explained
    - Think-back exercise was easy - just read the first sentence and you know what the question is

4. Tell me about choosing your topic and your own questions
    - Topic was easy; choosing your own questions was hard
    - Didn't know what to ask
    - It was hard to ask open enough questions
    - When you looked at information some sites didn't have anything and you had to go back and change questions
    - All the bullet points looked like you had to find lots of information - way too much

5. What was it like finding information to answer your questions?
    - Some questions were hard
    - Some books were too fat
    - Hard to find books on your topic
    - When I searched for how to draw a horoscope I got things to buy

- Sometimes I got bored and frustrated and angry
- It was hard having to look things up in the library
- Information was limited -didn't have a wide range to choose from
- Couldn't understand some of the words
- Sometimes the question didn't match the information you had
- In that case you had to try to think of ways the information matched ; take away the stuff that didn't match ; take away the extras; be so thorough
- I changed the question when I couldn't find anything

6. What sort of information did you find was best?
   (Huge argument over whether books or internet best -group evenly split)
   - On the Internet you can find anything
   - Nothing in the Library on Mariah Carey
   - Yes there was
   - Books were easy - you just had to use the index
   - You could always go back the book didn't change
   - More information on the internet
   - Both were easy

7. How did you find your information?
   - Used keywords from mindmap to find the information
   - Used my starsign
   - When I read the information I found more keywords and used them

8. Tell me what you thought of using dot and jot
   - Weird because you could put one word or a whole sentence
   - Took ages had to pick out the best ones
   - Didn't need to (copy) as shows you read the information and you know the stuff that could help your information
   - Put long sentences as well
   - Doesn't waste time

9. What did you think about the research log?
   - Didn't need the log
   - Just made it up
   - We were just doing the same thing everyday

10. What did you think of the evaluation?
    - Don't need to do that
    - We knew what we'd done
    - It was good to see what other people did
    - Would have liked the work to become a presentation -a speech or a project
    - Would have liked an end-point
    - Just notes doesn't show what you've learned
    - Didn't see the process of research

11. What would you tell me if I asked you to describe the research process
    - Topic questions answers to questions information go over information finished product
    - Closed/open questions
    - Think about your topic
    - Make the proper questions to each question
    - Topic questions answers how you found them where you got them dot jot
    - Topic questions information answers where you got it what sources you used how you got your sources.

Appendix VI

Dot-Jot

Students make a dot and then jot down one point, idea, or fact. They should try to keep to one line per point and they should not use complete sentences as these are notes only.

Students practise doing this. Give the students a key question. For example -
Where do Maori originally come from?
Use two or three sources, such as

- *Virtual New Zealand: Maori Culture*
- *The Journey to Aotearoa*

They then combine their notes from each source and write a paragraph.

Dot-Jot Template

Key question 1
Source (web site, newspaper, etc.): Title: Author: Publisher: Year of publication: Place of publication: URL:
Dot-jot notes
•
•
•
•
•

•
•
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Appendix VII

Changes To Original Unit

Thoughts about Year 9 Research

1. Pre-search work on the whole worked really well. Seemed to understand difference between closed and open questions and "think back" exercise of putting questions in front of paragraphs seemed to work well. Some classes might need more explicit teaching of specialized science vocabulary.

2. They did seem to experience difficulty in using the mind map about their own topic and forming their own questions. Suggest modifications to existing format and a teacher checkpoint here - teachers take in work to mark it and make sure questions are on right track. Even after this some students changed their question (and in a couple of cases their topic) as resources proved difficult to find - but this is the nature of dynamic research.

   A suggested format is the changed star diagram on the following page. I also altered the Think, Wink, Decide sheet so it was headed:

Think **(What I already know about my topic)**	**Wink** **(What I need to know about my topic)**	**Q** **(Questions I need to ask)** Check that they are open questions. Underline useful keywords.

REACH FOR THE STARS - MY TOPIC

Sort what you already know about your topic on this mind map. Put the topic in the middle on the star. Sort your knowledge into categories and put them into the boxes. Add any detail you already know to the arrows that come off the category boxes.

3. Might put more emphasis on keywords teaching it as language i.e. the idea that a keyword is always a noun and that sometimes you have to think of a noun that fits your question e.g. if your question is "What is the sun made of?" you'll get a better response if you look for sun composition rather than just sun

- or you might look for composition in an index or contents of a book about the sun.

4. The evaluation worked really well as a co-operative exercise when I got them to pin-point each other's best points and check the referencing and reference logs. They wrote "compliments" or "suggestions" to each other. This meant allowing them more time to correct anything the others had found. Mostly it was sources not referenced.

5. Asking them to pick the best ten points per question was a bit unrealistic. They didn't always get that many, and I think if they did they were writing down almost anything and not really discriminating. I think it would be better to suggest looking for the best 3 or 4 and then they'll really have to discriminate. We don't need to tell them this until they do it - otherwise they may feel they only need to find 3 or 4.

6. I also have a bit of a query about the number of sources we're asking them to use. One child fulfilled all the excellence criteria using only two sources - she just found two very good ones that answered all her questions. Should someone be penalised in that instance?

7. Need to alter the recording of sources to make plain what type of reference they do for what type of source - probably need an exemplar sheet.