Developing a Thinking Community
in a Problem-Based Learning Environment

Birkdale Intermediate School in Auckland, New Zealand has a roll of 550 Year 7 and 8 students. We have developed a school wide problem-based learning approach in social studies, science and technology which infuses skilful critical thinking into content instruction. This structured inquiry approach is supported by our own specially created multimedia CD ROMs. Our problem-based learning approach is used by all of our 19 classrooms.

Five years ago we identified a number of problems with our curriculum delivery - lack of engagement particularly from boys, lack of supported immersion in the real world of an independent learner, lack of challenges that develop the ‘habits of mind’ when higher order thinking is infused into our work and a gap between the variety of learning styles that can be developed in a modern classroom and the restricted range being offered in our classrooms. To overcome these problems we set ourselves a goal of the development of a thinking community with a focus on independent learning skills. To achieve this particular goal we are developing a problem-based learning approach that has its roots in a number of places.

Our first attempts to overcome these barriers was to work with Gwen Gawith’s action learning inquiry model. Our teaching staff completed the action learning professional development course. When we put this into practice we found it strengthened our class programmes in the teaching of research skills but still left us with an obvious engagement problem and a need to strengthen the vital area of question formation.

Three of our senior staff attended the 10th International Thinking Conference in Harrogate, England. The strong message we gained from people like Robert Swartz, Arthur Costa, Yoram Harpaz and Adam Lefstein was the need to infuse higher order thinking into the very way we worked. Ideas began to form around the problem-based learning model which infuses higher order thinking and independent learning skills in the way it presents the challenge of a ‘real world’ problem with no one correct answer.

Once we began using this approach in our classrooms it became clear that there were major resourcing problems. The problem-based scenario focused the learning in a way the topic approach never did. Quality resources that focused on the scenario were now essential. In the past just about any resource on the topic would do. This was clearly not going to work with PBL. All 19 classrooms needed specially selected resources - a pile of books on the general theme from the library was no longer going to be good enough. We looked at ways to securely deliver these resources when needed by each classroom.

We settled on developing our own collection of multi-media primary source material packaged on CD ROMs. This meant that the quality resources needed to complete the unit were safely stored and available from our server to be loaded on computer hard drives - no more looking in a resource box to find a vital piece missing. Each resource could be accessed by anyone at any time. These CDs and their accompanying problem-based learning units we called Quests. A Quest for new insights and understandings. A Quest’s CD is made by imbedding resources such as video interviews, newspaper articles, letters, photographs in an exploratory environment (a colourful illustration based on the theme of the Quest).

For the Quest ‘Filemoni’s Dilemma’ the computer screen shows people sitting on mats in a traditional Samoan fale (thatched house with open sided walls). When the students click on the people or objects in the fale they can listen to video interviews, read newspaper articles
and look at photographs of Samoan life. All the resources are based around the benefits and problems faced when emigrating to New Zealand. The cost of a Quest CD is around $10,000NZ depending on its complexity. We have been fortunate to have the financial backing of the Tindall Foundation, a local charitable trust, who have so far generously financed five Quests.

This solved only part of the problem. Each class could now access these resources but not in the numbers needed to be effective. Our answer was to purchase computer pods that could be moved from class to class as and when access to the Quest’s resources were needed. After attending an ICT conference, Navcon 2k3 in Adelaide, Australia, we returned with the idea of desktop computers mounted singularly on small trolleys. These had been a feature of the conference venue, a newly built secondary school called The Australian School of Mathematics and Science. Desktop computers overcame the problems associated with laptops e.g. short battery life, high purchase price, lack of robustness, shorter usable life, and small screen size.

At first we planned to provide a pod of 8 computers but research by Garry Falloon, a New Zealand teacher, suggested that students working in co-operative groups of two was the most effective grouping. To test his research in practice we decided to provide a pod of 15 computers. This meant redesigning the classroom layout, reducing furniture, removing built-in cupboards and a sink, providing 12 pendant power cords and a wireless network. To move the computers from class to class in a timely fashion a corridor joining the classrooms together needed to be built.

At both the Thinking conference in Harrogate and the ICT conference in Adelaide we heard the ideas of two Israeli educationalists, Yoram Harpaz and Adam Lefstein. Their ideas helped us with two areas where our approach was still weak. The first was the scenario. Yes, the scenario did make it easier for a class with teacher interaction to formulate questions suitable for a twelve year old to investigate but engagement was still weak. Their idea of a ‘fertile question’ gave us a way through their ‘fertility test’ by which we could measure the quality of our scenarios and the likelihood that they would enhance engagement. The second area was the ‘new insights and understandings’ stage. Over a two year period we surveyed our teachers and found that as a PBL unit progressed past the ‘Discovering Relevant Information’ stage the process weakened. Yorum and Adams ‘concluding performance’ is helping strengthen the final stages of our PBL units by adding a reflective discussion where the students, through questioning, seek to urge each other to define and clarify their terms, arguments, position and ideas.

With the use of our Quests an ICT literate staff became essential. Along with the action learning course the teachers completed the ICT and Learning paper and received 1-to-1 training over a three year period from a Team Solutions facilitator as part of the ICT PD Cluster support given by the Ministry of Education. The arrival of teachers’ laptops, in part funded by the Ministry of Education, also gave this a tremendous boost. To support the development a teachers problem-based learning handbook was written and we produced a DVD with our teachers explaining and demonstrating key parts of the problem-based learning approach.

As the school was in a renovation phase it was possible to add additional features that supported the PBL approach. In each teaching team a shared area is being built off the corridor and between two toilet blocks. Named the ‘nest’ it has internal sound proof glass windows fitted. The two classrooms directly across the corridor also had these windows added to allow teachers to visually supervise groups of students working semi-independently. Ceiling mounted data projectors and inbuilt sound systems were added to strengthen learning styles and facilitate the discussion around the scenario, teacher modelling and the sharing of new
knowledge through the concluding performances.

To review our performance we first tested our progress by undertaking a research project on the effectiveness of our approach. Mr Nick Neubert, Deputy Principal, completed a paper on problem-based research at the University of Auckland. The research carried out as part of his paper showed a marked difference between the students learning in our fully resourced problem-based learning teaching teams and the rest of the school. At the end of a social science Quest we measured student achievement against a school wide rubric. 33.8% of students in the traditional classrooms were below expectations when measured against curriculum levels, while in the fully supported rooms only 7.8% were below. Secondly we contacted a number of experts from outside of our school to act as ‘critical friends.’ Robert Swartz, Adam Lefstein and Jamie McKenzie were all kind enough to provide feedback on our programme. Among the feedback we received was a challenge to make the critical thinking a more prominent part of our Quests. This made us look closely at our students abilities. It was clear that critical thinking skills were not developing by mere osmosis. Problem-based learning alone would not be enough, thinking skills would have to be explicitly taught. Dr Robert Swartz, the Director of the Centre for the Teaching of Thinking in Boston, Massachusetts, is a world expert in the infusion of these skills into classroom programmes and his ideas seemed to hold the answer to our problem. This year two of our senior staff attended his Summer Institute in Boston to gain the skills needed to infuse critical thinking into our problem-based learning Quests, and during a recent visit to New Zealand he gave a keynote presentation and ran workshops during our annual cluster conference. The impact of this change of focus has been very positive. We are presently upskilling our teachers in this approach and rewriting our units to infuse critical thinking skills such as skilful compare and contrast.

So far we have developed the following Quests with supporting CD ROMs:

**Lest We Forget**
**Skilful Decision Making**

Scenario - On hundreds of War Memorials all around New Zealand you will find the words ‘Lest We Forget’ engraved in stone, etched into glass or cast in bronze. These monuments are designed to last many centuries. People have gone to a great deal of trouble and expense to get this message to everyone who stops and reads the words. What should we remember about War?

**Filemoni’s Dilemma**
**Skilful Compare and Contrast**

Scenario - Filemoni is a 13 year old Samoan student. He is the eldest of five children. He lives in a village on the island of Upolu with his mother, father and siblings. His parents are thinking about emigrating to New Zealand under the belief that the children will be able to have a better life there. They would be able to stay with extended family members in Auckland. However, Filemoni is very confused and has called upon his friend (you) in New Zealand to help him through this time. Using skilful ‘compare and contrast’ what would you say to Filemoni? Should he come or should he stay?

**Disaster Strikes!**
**Skilful Decision Making**

Scenario - Every year we strongly support World Vision’s 40 hour famine. World Vision has been providing disaster relief to the earthquake stricken state of Gujarat in India and the city of Bam in Iran. Anyone giving money has the responsibility to be well informed on how this
money is used. If you had input as to where the funds should be spent in an earthquake, which 3 areas would take the highest priority?

**Aye Aye Captain!**

Skilful Compare and Contrast

Scenario - Two famous names in exploration are Captain James Cook of the Endeavour and Captain William Bligh of the Bounty. They are important figures in world history but does this mean they are ‘great’ people? We need to ask ourselves how well do we really know these explorers? What were they really like as people? Were they ruthless or compassionate and humane? So...in considering these questions, who would you wish to sail with, Cook or Bligh?

**Faster, Higher, Stronger**

Skilful Decision Making

Scenario - One day you or someone you know will be standing in an Olympic or Commonwealth stadium while the athletes’ oath is taken. “In the name of all competitors I promise that we shall take part in these Olympic Games respecting and abiding by the rules which govern them, committing ourselves to a sport without doping and without drugs, in the true spirit of sportsmanship, for the glory of sport and the honour of our teams.” Can we live up to the true spirit of sportsmanship?

**Not a Drop to Drink**

Skilful Prediction

Scenario - Many New Zealanders take our safe and reliable water supply for granted. Taking things for granted can be difficult and costly when something suddenly goes wrong. When a resource like water becomes scarce our view of it changes. Using your knowledge of skilful prediction how would your view of water change if the taps failed?

**Let the Buyer Beware!**

Skilful Compare and Contrast

Scenario - Your family is about to purchase a very expensive new house. The real estate agent has shown you places in the Thorne Bay area, Takapuna and others on the cliff top south of Takapuna Beach. As it is so costly you decide to investigate everything possible about the two locations. Make sure you take a very close look at the geology of the area before making your choice. Which house would you buy and how does your new knowledge of the geology of these two areas affect your decision?

Our focus over the next few years is to develop an in-depth understanding of problem-based learning and to provide additional Quests to support the classroom implementation of this structured inquiry approach.

For a more indepth look at our Quests please check out the problem-based learning section of our web site at www.bis.school.nz
Problem-Based Learning

What is a Quest?

A Quest is a unit of work lasting approximately five weeks. Quests are how we implement our problem-based learning approach.

They are designed to activate children’s thinking skills with activities that develop different types of thinking such as:

- Decision making
- Critical thinking
- Creative thinking
- Problem solving
- Searching for meaning

We start with a carefully crafted scenario that sets the scene for the following stages:

- Authenticating the Learning
- Awakening Prior Knowledge
- Strengthening Prior Knowledge
- Constructing Relevant Questions
- Discovering Relevant Information
- New Insights and Understandings

Once you set in place a scenario you narrow the research to finding an answer to a particular problem. No longer will just any resource related to the topic provide the information needed. Quality resources must focus on the scenario. A Quest includes a collection of such focused resources.

Put simply it is a collection of multi-media primary source material packaged on a CD ROM. The CD contains a ‘real world’ problem embedded in the scenario with no one ‘correct’ answer. The students form co-operative groups of two to investigate the problem, search the resources for the information needed to make an informed decision and solve the problem.

A Quest with its multi-media resources, challenging scenario and open ended approach enhances the teacher’s ability to develop learning styles, higher order thinking and information literacy skills and focus on the ‘Habits of Mind’ while also covering disciplinary knowledge bases and skills.
The resources for the Quest are carefully selected by teachers to reinforce the move from LOTS (low order thinking skills and lots of information), to a more focused HOTS (higher order thinking skills), approach. The Quest packages the most important resources in a form that ensures it will be available next time the unit is taught. No more going to a resource room to find a vital resource missing!

The Quest also frees the teacher from the time consuming task of collecting the major resources for the unit. This allows time to set up additional activities e.g. make contact with any ‘expert’ that will be contacted by students via e-mail, phone, fax or video conference. They now have time to prepare any front-loading activities they feel will be needed, knowing that the bulk of resources are already prepared.

The teacher books a computer pod of 15 computers, chooses the co-operative pairs and sets the scene by introducing the scenario. The class then works through the problem-based learning stages as outlined in the unit plan.

Each Quest ends with a concluding performance (may be a lecture, a drama, a mock trial etc) in front of an audience for feedback.

Each Quest is set in an exploratory environment.
This is a guide to the time allocation for a problem-based learning Quest. We allocate 3 to 4.5 hours (2 to 3 Blocks) per week, according to the phasing of the Specialist Timetables, and where appropriate there is integration into English. More time can be needed in Term 1, particularly with a Year 7 class. Quests vary, ones that include an EOTC experience, guest speaker or science experiment may take a little longer.

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<th>Week 1</th>
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| **Authenticating the Learning**  
Introduce the scenario. | **Constructing Relevant Questions**  
Clarifying the problem. | **Planning the Research**  
Developing a plan of action. |
| **Awakening Prior Knowledge**  
What do we already know about this problem? | | |
| **Strengthening Prior Knowledge** | | |
| **Discovering Relevant Information**  
Locating and selecting. | | |
| **Constructing the Knowledge**  
Forming and applying. | | |
| **New Insights and Understandings**  
Forming, presenting and evaluating. | | |
About two weeks before a Quest begins we place movie type posters around the school to raise expectations.

During a Quest flags are placed along the entrance paths to the school to signal it’s importance.

A display in a glass cabinet is also set up in the library to increase interest in the Quest.
November 1, 2006

Richard Coote, Principal
Birkdale Intermediate School
AucklInd, New Zealand

Dear Richard,

I want to thank you for your wonderful hospitality in my visits to your school. But more than that, I also want to tell you that the school has done a fine job in developing your Problem-Based model for instruction, and in implementing it. In fact, you have something quite unique and extraordinary. I was very impressed by the variety of ways that your teachers had integrated and infused direct instruction in really important thinking skills and habits of mind into their content instruction, all within the challenging problem-based framework that the school has created. The students I spoke to all told me how much they love learning that way, and I have never seen, in a regular public school, such a large number of students who are so drawn in that they didn’t want to leave even after the school day was over. Congratulations to all of you!

You know, I am thinking that there are many teachers and schools around the world who are trying to figure out how to do what you have accomplished, and who could benefit from hearing about Birkdale. Let me encourage you to send a proposal in to the 13th International Conference on Thinking so that you can do a presentation at the conference in Norrkoping, Sweden, in June, 2007. I project that there will be over 1500 educators at this conference. I’ll bet your session will be mobbed!! And let me say that if there is time I will be glad to introduce you and your team to the audience with a few words at the start of your session. That’s the best way to “spread the word”, and your word will be eagerly heard by many many educators.

Sincerely,
Bob
Robert Swartz, Director
National Center for Teaching Thinking, USA
Online Learning Award

Recognizing creative teachers for their pioneering use of telecommunication networks to provide innovative learning opportunities for school-age students, 2004.

Presented at the Telecommunications Association of New Zealand’s Primary Conference, Auckland 2005 & 2006
TUANZ Secondary Conference 2006


Presented at the National Education Computing Conference, New Orleans, United States of America 2004


Presented at the National Centre for Teaching Thinking’s Summer Institute held at Tufts University, Boston, Massachusetts, 2006

Presented at the Western Academy of Beijing, China, 2005

Finalist Computerworld Excellence Awards 2005

Presented at the New Zealand Ministry of Education’s LEARNING@school conference, Rotorua, 2005 & 2006

Presented at the Telecommunications Association of New Zealand’s Primary Conference, Auckland 2005 & 2006
TUANZ Secondary Conference 2006


Presented at the National Centre for Teaching Thinking’s Summer Institute held at Tufts University, Boston, Massachusetts, 2006

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