

*“We looked at the constellations and from them drew our guidance and direction to travel boldly into the knowledge society.”*



# Key Competencies in Action

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The learning is not over; this is a step on the journey. It is a journey that will continue for me next year, back at school. Our school has begun to flesh out the Key Competencies and I want to be part of that. Please feel free to contact me if you have any questions about my research.

# CHAPTER 1: INTRODUCTION

## 1.1 My Situation

I am a Secondary School Teacher currently teaching at Hauraki Plains College. The College is situated on a 9.5 hectare site beside the Piako River in the small rural township of Ngatea. It is a co-educational rural secondary school on the Hauraki Plains. The college has experienced increased roll growth in recent years and has consequently introduced an enrolment scheme. There are approximately 600 students; the decile rating of the college is 4. The college has a teaching staff of 47.



Hauraki Plains College

I have been teaching for 17 years and have taught Science and Physics at Hauraki Plains College for the last six years. I have been involved with students in participating in the recent Science Video Competitions run by the Royal Society of New Zealand and have taken part in the ipaint professional development contract for our school.

Our school has started on the journey of seeing how the Key Competencies will help us to go forward with vision. There have been a number of meetings on how the Key Competencies fit into the direction that we as a school are wanting to head.

From this big picture I am interested in how the Key Competencies might be demonstrated in the classroom/curriculum using a range of ICT tools.

The Principal of Hauraki Plains College, Ngaire Harris, has consulted with staff and members of the community to produce and develop a visual charter for the school. It is a charter that contains images that have meaning and significance for the community, staff and students at the school. The charter is reinforced by the principal and staff in a number of different contexts including the following: assemblies, school newsletters, sporting code of conduct, heritage week, school notices and staff meetings. Our charter recognises where we have come from, who we are and where we, as a school, are intending to head. The elements displayed within the charter all have meaning, especially to the students, staff and community of Ngatea and the surrounding Hauraki Plains. It is a vision that can be owned and easily understood. Each person can interpret it according to the understanding that they have at any point in time. With a continual emphasis on the meaning of each part, as it applies to our school development, we, as a school community, can grow in the understanding of "*Our Story*". It is useful to examine each symbol to see how it fits into an overall story that gives a sense of purpose for the students and staff of Hauraki Plains College. It is representative of a meta-story of the Key Competencies as they apply in our situation; a macro-view, of sorts.

Around the outside of the charter is our framework for learning. These are the guiding principles of our school's purpose, to develop students in the three main areas, that is, community, character and competence. These are areas in which all individuals can develop. Each of the symbols on the charter is known to the community and is unfolded to the students. They are designed to develop the students in the areas of community, character and competence. They tie in with the concept of Key Competencies being needed for individuals in a changing society.

### **Excellence is Our Tradition:**

This is our mission statement. Excellence is the standard by which we measure everything that we do. We pursue excellence; this does not mean that we are perfect, only that we are always striving to be our best selves. In this school it is cool to care about excellence.

### **The Rowing Boat or Waka:**

Arriving into the school is likened to boarding the boat or waka, which takes the students towards their future. Like rowers, there is a need to be self disciplined. Students will need to know how to learn and to continue learning over the whole course of their lifetime. There is a need in this world of change to be a lifelong and lifewise learner. The teachers work is to teach the students how to learn and how to row well. Both the individual and the team must be able to row well. How students do their work determines how well the whole boat or waka travels. The hope of the school is that the students paddle hard, travel well together and enjoy the journey. This can happen if we work together.

### **The Pioneer:**

Around one hundred years ago, others came to this area of the Hauraki Plains. These pioneers set about transforming the swamp into a large farming area. Pioneers work hard. They commit to goals and dig it in when the going gets tough. Pioneers don't give up, they bounce back from failure. They do their best work.

### **The Cabbage Tree:**

Symbolises being and becoming who we are. It means being true to ourselves and our own uniqueness. Finding talents and developing them so we can make our own unique contribution to the world when the time comes. It speaks about kia kaha, standing strong. It is about growing into all we were meant to be.

### **Whale Rider:**

Centuries ago the Hauraki Plains was one vast swamp. It was to this land that Hako, the ancient ancestor of our local Maori people came. The story is told of Hako who travelled up the Piako River on the back of a whale and settled a people in this area. Whale riders are ordinary people who do extraordinary things; they dare to be different and go further than what people believe. Whale riders make a difference and leave a legacy.

### **Quisque Pro Omnibus:**

Our school motto, meaning "Each for All". This is like a water mark for our journey. It is on the students' shirts, over their hearts and stamped on everything we do. We do not make our journey alone. We work together, like the rowers in the boat; we are in this together. We are not only about ourselves and our own interests. We look out for the interests of others. "Each for All" is the motto to live by.

### **The Dog Box:**

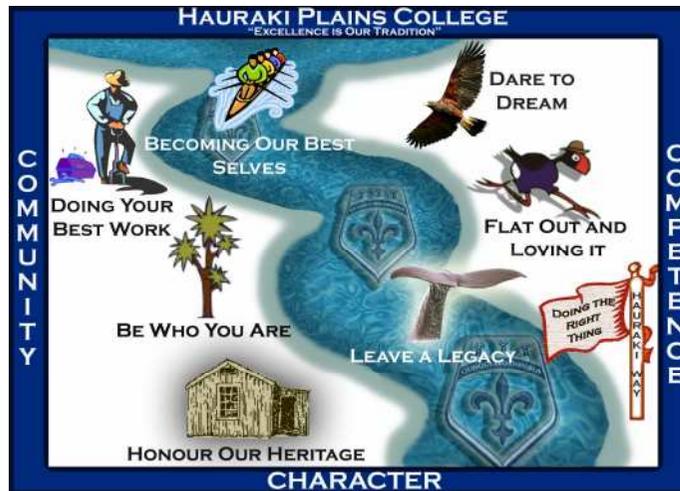
The Dog Box was the original and only building of Hauraki Plains College. The school began 94 years ago in a little one room shack with 13 pupils - 8 from pioneering families and 5 Maori pupils. We appreciate our beginning, however humble, as it speaks of our identity. We honour our heritage, particularly the proud traditions of the college.

### **The Hawk:**

As the hawk soars above the horizon, we encourage students to dare to dream. Big dreams take us higher and further than what we believe is possible. Dreams are about believing for a life we want and having the courage to take risks and go after that sense of destiny that lies within each of us. We dare students to dream and go after their dreams with all that they have.

### **Pukekos:**

Pukekos are "flat out and loving it." The pukeko message is the importance of giving things a go and making the most of opportunities. It gives a message to enjoy the opportunities that college offers and for students to go hard and give it 100%.



**HAURAKI PLAINS COLLEGE CHARTER**

### **The Hauraki Way:**

The Hauraki Way is how we do things around here. It is our standard, our line in the ground and our bottom line expectations. We expect students to show respect, be considerate of others and take responsibilities for their own actions. The Hauraki Way is about doing the right thing even if it is the hard thing.

### **The River:**

Symbolises the three rivers which run through Hauraki - Ohinemuri, Piako and Waihou which flow to Tikapa (the Firth of Thames). The hapu groups are named after these four waterways. The river speaks of purposeful directions and pathways within the school and beyond. The students are at school for a purpose - to learn, to seek the qualifications and to develop the personal qualities needed for a successful life and work when they leave school. The Piako and Waihou widen and flow into Tikapa, the Firth of Thames. The students are on a learning journey to their future and there is an important part for the school to play in preparation for their future lives beyond the school gates.

## 1.2 Key Competencies History

The Key Competencies are not just a New Zealand phenomenon but are grounded and based on significant research carried out by the Organisation for Economic Co-operation and Development, (OECD). The research project was called **Defining and Selecting Key Competencies, DeSeCo Project** (OECD 2005). In 1997, OECD member countries launched the **Programme for International Student Assessment, PISA**, which aims to monitor how students nearing the end of their compulsory schooling have gained knowledge and skills essential for full participation in society. One of the factors driving the development of PISA was its relevance to the idea of individuals as lifelong learners and the ability to report on such things as motivation to learn, beliefs about themselves and learning strategies. The DeSeCo Project provided a broader framework for assessment than the original PISA focus and could guide the longer-term extension of assessments into new competency domains.

The importance of competencies is emphasised in the DeSeCo project report. (OECD 2005)

### Why are competencies so important today?

Globalisation and modernisation are creating an increasingly diverse and interconnected world. To make sense of and function well in this world, individuals need for example to master changing technologies and to make sense of large amounts of available information. They also face collective challenges as societies – such as balancing economic growth with environmental sustainability, and prosperity with social equity. In these contexts, the competencies that individuals need to meet their goals have become more complex, requiring more than the mastery of certain narrowly defined functional skills.

Each competency supposedly will: contribute to valued outcomes for societies and individuals, help these individuals meet demands in varying contexts and apply to all individuals. So, where does this leave the individual who chooses to live a life as a hermit, monk or nun? According to Professor Jack Goody, these individuals are likely to conform to the good life but are successful only in a limited context, as judged by the majority of society's standards, since they choose to withdraw from society. (NCES)

This raises for me a question, what is living a successful life? The answer may not be just being a successful contributor to society or having the knowledge, skills, attitudes and values proposed by the state. It is more than that for me - it is being true to oneself and recognising spirituality and beliefs. Mason Durie's model of Maori health (Durie 1994) recognises the need for a focus on the whole house (whare), that being the four walls of: Taha Wairua (spiritual), Taha Hinengaro (mental health), Taha Tinana (physical health) and Taha Whanau (social well being). This is no less true for Pakeha. Stephen Covey in his book "First Things First" (Covey 1994) puts it another way, "To live, to love, to learn and to leave a legacy." Perhaps this is true success.

The idea of success outlined in the OECD report suggests that individuals will have purposeful employment, enjoy safety, participate in the political process and have social networks. A successful society is one that includes economic productivity, social cohesion, equity and human rights, democratic process and ecological sustainability.

This set of criteria would mean that some non-OECD countries, such as China, are not successful on the basis of a number of the criteria, including the area of “democratic process”. The Chinese government would most probably not agree with this definition of success.

Is there no room for spiritual beliefs in the future society? Many people find that these beliefs give purpose and hope. If these values are not espoused, why should other people’s values be promoted?

Why, in our society, when these “successful” elements have been systematically introduced, do we get some of the “successful” individuals committing crimes? The question of what is success may be more than the OECD’s idea of success. The definition of success may be different for individuals and a purely materialistic view of success is not what everyone is focused on. Nevertheless, the DeSeCo’s Key Competencies may be a sound base for an individual’s educational development.

The three broad categories within the DeSeCo conceptual framework see the need for individuals to:

- use tools interactively
- interact in heterogeneous groups
- act autonomously

A reason for individuals drawing on these Key Competencies is seen as preparation for a world that is changing and becoming more complex and interdependent. Technology is changing at a rapid pace and it is the skills to adapt to and use technologies yet undeveloped which will be important for the future students. This means that individuals need to think for themselves and to take responsibility for their learning and action. It is expected that, in any particular context, a set (constellation) of competencies could be expected to be drawn upon.

A subsequent survey of the implementation of Key Competencies in OECD countries has shown that, in the wider European context, Scotland and England have introduced explicit Key Competencies into the general curriculum. However, a 2002 survey discovered that all EU countries included either explicit or implicit reference to the development of the Key Competencies. (SQA 2003)

The most recent OECD strategic objectives came from emerging policy concerns, identified in 2003 by the Chief Executive Officers of the Education Ministers in OECD countries. These concerns have reshaped the work of the OECD since. Six objectives summarise the ongoing work. They are:

1. promoting lifelong learning and improving its linkages with society and the economy.
2. evaluating and improving outcomes of education.
3. promoting quality teaching.
4. rethinking tertiary education in a global economy.
5. building social cohesion through education.
6. building new futures for education.

(OECD 2005-2006)

The focus on Key Competencies can be linked to a number of the objectives listed above.

In a further elaboration of objective six, the role of information and communication technology (ICT) is emphasised.

“There is considerable policy interest in understanding and optimising the potential of ICT for learning.” (OECD 2005-2006)

The Key Competencies which have been identified from the DeSeCo report form the basis of the set of Key Competencies that New Zealand will implement in its education system. These Key Competencies include knowledge, skills, attitudes, and values. This implies that they will need to permeate the learning areas of the curriculum.

### **1.3 New Zealand and the Key Competencies**

The New Zealand National Curriculum has been in existence in various forms for well over 100 years (McCulloch 1992). Curriculum and assessment policies in the 1990s focused on what students are expected to know and do i.e. a focus on the “achievement” objectives. A draft discussion on the National Curriculum in 1991 proposed a new structure and led to the development of the New Zealand Curriculum Framework published in 1993. This introduced the seven learning areas and eight groups of essential skills. Sets of learning objectives, describing what students should know and do, were arranged in a series of eight levels ranging from the Year 1, New Entrant intake, to the Year 13 students. (Phillips 2000).

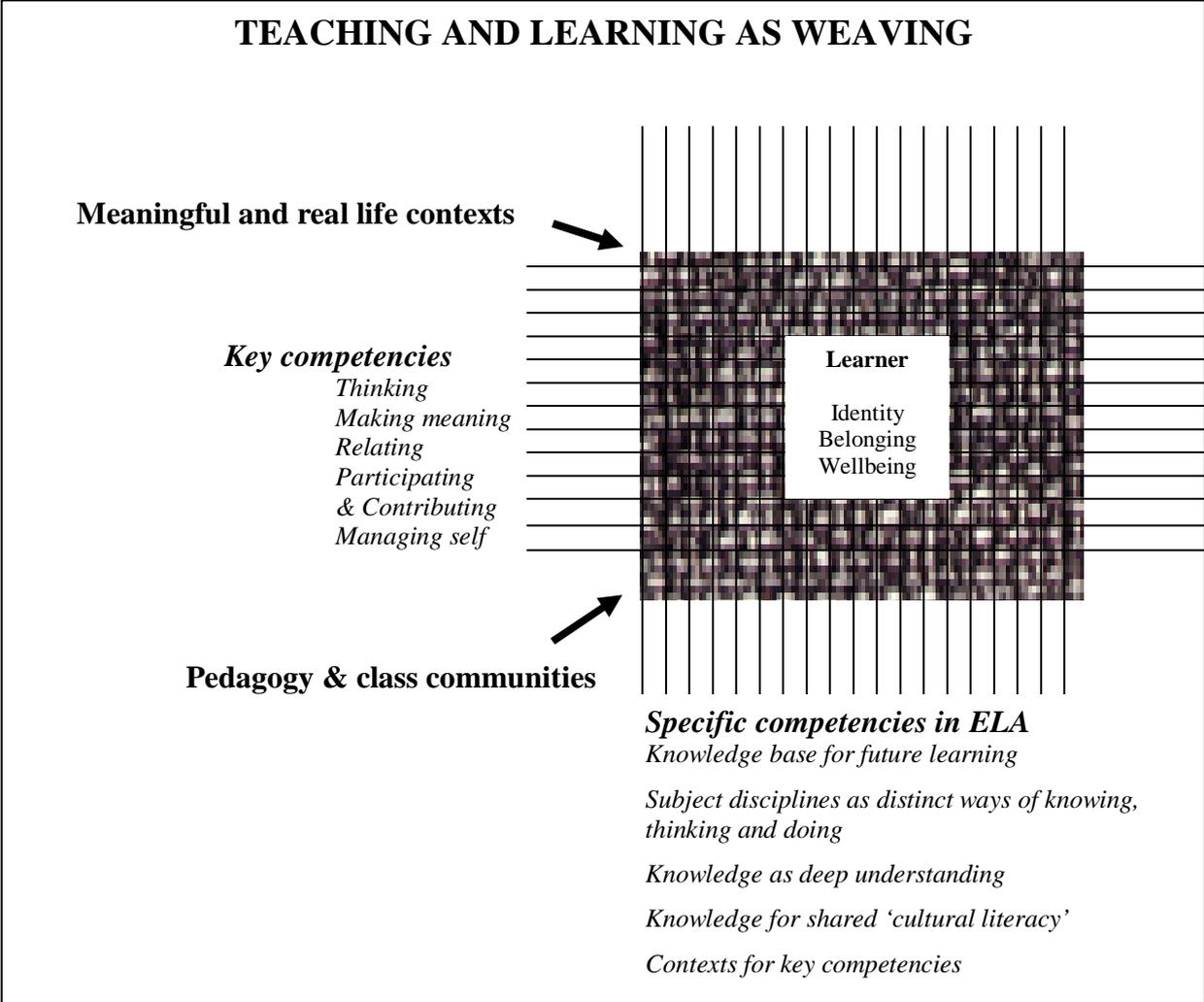
Melissa Brewerton’s paper (Brewerton 2004a) outlines the need for New Zealanders to have the competencies necessary to participate effectively in society and the need to develop new competencies to meet changing demands. This background paper takes a look at reframing the existing essential skills that were developed in the early nineties. Brewerton defines the essential skills as “the skills all people need in order to operate across all areas of life contexts, and which all learners therefore need to develop across and within all essential learning areas”. Essential skills are part of wider Key Competencies, which also include “know-how” knowledge, attitudes and values.

When people operate in life contexts, they use specific competencies, which are relevant in particular contexts. e.g. When sailing a yacht, specific knowledge is needed to perform this competently. They also use generic or ‘key’ competencies which apply across all contexts, such as ‘relating to others’, which could be critical when sailing a yacht that requires more than one person to sail it. The combination of Key Competencies that will be needed for differing contexts will change. For some contexts, relating to others may be of a greater priority than another key competency. This relates back to the idea expressed in the DeSeCo report of competencies being expressed as ‘constellations’ of competencies together.

Brewerton suggests that there are a number of implications for teaching practice in the understanding and teaching of essential skills; that the Key Competencies will need to be specified and articulated in differing learning contexts. Teachers will need to think about how the Key Competency constellations are manifested in learning outcomes, without treating them as a skills checklist. They will need to be taught across a range of meaningful of contexts. Key Competencies need to be taught, assessed and reported systematically. (Brewerton 2004a)

The idea that the lists of essential skills, values and attitudes be replaced by five key competency groups was the result of the process of consultation. (Rutherford 2004). The five groups put forward in this paper were Thinking, Making Meaning, Relating to Others, Managing Self and Participating and Contributing.

In Brewerton’s paper (Brewerton 2004b) about thoughts on what students need to learn at school, she discusses the importance of contexts for learning. Contexts are important in relation to both content and engagement in the learning process. Even the Key Competencies can be dependent on the context. e.g. They may take different forms in varying contexts and, for instance ‘relating to others’, may take different forms in a hierarchical context compared to an egalitarian context. Learning that involves real life contexts and is meaningful to students allows them to contribute to their world and therefore engage with learning that has meaning for them. (Russell 2004). The following diagram outlines the fit between key and specific competencies and meaningful real life contexts.



(Brewerton 2004b)

The review of the NZ Curriculum gives an opportunity to rethink what is needed for students to ‘succeed’ in a changing and information rich society. The idea of using relevant contexts for learning involving the teaching of specific and Key Competencies is the current emphasis of the curriculum reforms. Key Competencies are related to learning to learn and being a lifelong learner.

The most recent Key Competencies draft statement looks at the opportunity for students to develop their competencies in contexts that are wide-ranging and complex. The five Key Competencies that are identified are:

- Managing self
- Relating to others
- Participating and contributing
- Thinking
- Using language, symbols and texts. (Initially, Making meaning)

General descriptions of each competency are given below and have been taken from the March 2006 Draft Statement.

**Thinking** is about all kinds of thinking in all kinds of contexts. It includes creative, critical and logical thinking, and the ability to think about thinking – as well as self-awareness, reflection, and judgment.

**Making meaning** is about discovering meaning in ideas – represented as they may be in any of their countless forms. It is about interpreting cues and clues; about getting below the surface, about wanting to get to the bottom of things.

**Relating to others** is about the knowledge, skills, values, and attitudes needed for living, working, and playing with others. It includes the ability and inclination to take a variety of roles in group situations – for example, leadership, conflict resolution, and negotiation – and demonstrating consideration for others.

**Managing self** is about making good decisions for oneself whilst recognising that we are part of a wider, interdependent, social context. It is about the inner independence that comes from being given manageable amounts of responsibility and choice. 'Managing self' includes the ability to make plans, set goals, and estimate time needed for activities. It is also about developing strategies to overcome hurdles, and knowing when a change of course is needed.

**Participating and Contributing** involves gaining a panoramic view of what is possible. It is about seeing one's potential to be a member of multiple communities – for example, family, iwi, and friendship groups, or communities of artists, problem solvers, sportspeople, or mathematicians. By participating, we gain the sense of achievement that comes from making a contribution to local and global communities.

(MOE 2006a)

More extensive descriptions of the Key Competencies have been developed in the, more recent, New Zealand Curriculum: Draft for Consultation 2006 document. (MOE 2006b)

## 1.4 The Knowledge Society

The term knowledge society has emerged as countries move from an industrial to a post industrial age. This means a focus away from extracting and using natural resources to developing and using new forms of knowledge. Knowledge is increasingly being seen as dynamic and fluid, something that makes things happen, as opposed to a thing.

A major U.S.A. report into the skills needed for the 21<sup>st</sup> century (NCREL and METIRI 2003) discusses the fact that children are “growing up digital” and this means that their view of the world is very different from that of adults. The report states that 65 percent of children in the U.S.A. were online in 2003, up from 41 percent in the year 2000. Further to that, 90 percent of children between the ages of 5 and 17 used computers, at the time the report was written. The U.S. Department of Labour was quoted as saying: “We are living in a new economy – powered by technology, fuelled by information, and driven by knowledge.”

The report quotes a previous report on necessary skills, commissioned in 1991: “The influence of technology will go beyond new equipment and faster communications, as work and skills will be redefined and reorganised.”

In the shifting sands of future employment that today’s students face, it seems clear that higher levels of education to adapt to the new knowledge based society will be needed. At the time of the report, information from the CEO Forum (2001) stated that 85 percent of jobs required an education level beyond that of high school, compared to 61 percent in 1991. If the teaching of these 21<sup>st</sup> century skills is neglected, then there will be a gap between the workforce skill base and filling the creative employment opportunities that will arise from the technological society we are entering.

The challenge, as reported in *The Futurist* (Tucker 2006), that has developed is how educators will reach and teach the millennial generation. This generation is also known as the “echo boomers” and “Gen M”. They can be identified by the technology they use - ipods, cell phones, blogging and so on. Meeting their educational needs will be a challenge. The emphasis will need to be on teaching students to become effective learners with well developed critical thinking skills. For millennials, this may mean engaging them with co-operative learning exercises, allowing them to be decision makers and getting them to evaluate their learning strategies. This generation is generally known for an ability to multitask but not for its attention span or its ability to delay gratification. They have an appreciation for structured tasks that allow creativity and prefer real life contexts and issues that they are interested in. The challenge is in keeping them actively engaged.

Jane Gilbert (Gilbert 2005) suggests that there needs to be a shift away from the industrial age mentality that exists in most secondary schools today, where students are organised into batches (or year groups) and they progress through a step by step linear progression. She states that this process treats students the same and assumes that learning occurs the same way for each student. She continues to make the point that often the needs of systems are treated as having more importance than the students’ needs. It will require a major shift in thinking to move away from this model, which has been with us for one and a half centuries!

One possible approach that Gilbert takes from the American Educator Carl Bereiter, is that of future schools being knowledge-creating organisations, where school activities are restructured so that they resemble the workings of research groups. Groups that investigate real questions and contribute to real progress on those posed questions, not treating knowledge as something that is gained by individuals but creating knowledge, learning to do things with knowledge in collaborative teams. McCombs (McCombs 2000) says that for this to happen, the curriculum needs to de-emphasise mastery of specific content knowledge, so that students could be prepared to produce knowledge, use knowledge and become socially responsible citizens. To quote Thornberg:

“In the world of the past where access was limited, information was treated as a scarce resource and educators had the task of imparting this information for the benefit of learners. We used to live in a world where content was king. That world no longer exists. Content is abundant, and is, therefore, a poor base on which to base an educational system. What is scarce today is context and meaning. It used to be the mark of an educated person to have a vast reservoir of facts on which to rely. Today this skill is of much less value.”

(Thornburg 1999)

## **1.5 Learning Outcomes in ICT Contexts**

The value of using ICT as an agent of change, in the midst of curriculum change in the form of the Key Competencies, cannot be underestimated. There are a number of ways that schools might approach the integration of the Key Competencies with the use of ICT.

Voogt and Pelgrum (2005) examined 28 schools and found three main approaches to incorporating ICT within a school with the emphasis on preparing for the knowledge society; firstly, a thematic approach across disciplines within a school, secondly, incorporating innovative pedagogical practices within disciplines and thirdly, having a school-wide curricular focus. ICT is believed to be able to facilitate the implementation of a pedagogy that fits an information society. However, some of the complexities and problems Voogt and Pelgrum (Voogt and Pelgrum, 2005) list include: educational software that is isolated and not integrated with textbooks, many ICT applications did not line up with the curriculum, big classes and 50 minute periods inhibited teachers' ability to use ICT innovatively. They concluded factors inhibit the implementation of ICT in the curriculum and that often a gap exists between the intended and implemented curriculum. In-depth analysis of the schools in the study, looking across the three types of curricular implementation approaches, found that ICT innovative practices did not concentrate on new content but instead on the development of life learning competencies in the existing content or by presenting curriculum content in a different way.

In the school-wide curricular approach, an Australian school for instance had students develop and agree on rubrics for assessing the results of a Science project. A different school in the study had students write log books at the end of each week, describing how they worked, the subjects they worked on and what they could do better. It was concluded that the school-wide curricular approach produced goals that were related to responsibility for the students own learning – a new view on teaching and learning.

The Voogt and Pelgrum study and others like it highlight the possible advantages of using ICT to incorporate the Key Competencies, which are, in effect, a means of students taking responsibility for their own learning - responsibility in the areas of cognition, self management, participation and the building of relationships and connections with others.

## **1.6 ICT and Engagement**

In John Schacter's report (Schacter 1999) we find an analysis of five of the largest scale studies of education technology in the nineties - more than 700 empirical research studies, a review of the entire state of West Virginia, which looked at the newer educational technologies at that time.

His results show that students demonstrated positive gains in achievement on researcher constructed tests, standardised tests and national tests when they had access to:

- Computer assisted instruction
- Integrated learning systems technology
- Simulations and software that teach higher order thinking
- Collaborative networked technologies
- Design and programming technologies

In Schacter's review of the Apple Classrooms of Tomorrow (ACOT), the positive findings were found to be learning experiences that required higher level reasoning skills and problem solving, although these findings were not conclusive. Another finding was the positive impact on the students' attitudes and on changing teaching practices from less teacher stand-up lecturing toward more co-operative group work.

In Schacter's conclusion, he says some evidence from the studies points to learning technology being less effective or ineffective when the learning objectives are unclear and the focus of the technology use is diffuse. A quote from the then, Co-Director of the Educational Technology Center at the Harvard Graduate School of Education puts it this way:

"One of the enduring difficulties about technology and education is that a lot of people think about the technology first and the education later."

This still seems to be as relevant today as it was in the nineties.

Computers have been described as a critical factor in the development of positive attitudes to learning in Lepper and Hodell's study, (Lepper and Hodell 1989) which looked at intrinsic motivation in the classroom.

There appears to be increasing evidence to support the idea that computers help improve the attitudes of students to learning, staying more on task and becoming more motivated. Pittard (Pittard, Bannister et al. 2004) who summarised a set of large-scale studies on the impact of ICT on pupil attainment, motivation and learning, puts it this way:

“There are also some clear messages about the motivational potential of using ICT in teaching and learning, and the opportunities ICT affords for both engaging pupils directly and motivating an engagement in subject learning via the use of ICT. But any added value of ICT in educational terms is clearly not just based in the fact of ICT provision, or the amount of use pupils make of it.

...it is dependent on the types of use to which it is put.”

Again we see that indiscriminate use of ICT may not necessarily result in student motivation. Use of ICT needs to be well planned and not merely for the sake of using it. ICT is seen by some as problematic and not a panacea for the development of our society. Mark Brown (Brown 2004) attempts to uncover some of the ideological assumptions behind the drive to reform schools through new computer technology and points out the danger of treating ICT as a neutral tool, independent of powerful social, economic and political forces. Larry Cuban (Cuban 2000) quoted from Education News also paints a more negative view.

“If employers really want generic skills, and if most skills in manoeuvring software applications can be quickly picked up by adults, why spend so much money on wiring schools and buying hardware and software? With so little evidence that major expenditures for equipment and networking have a payoff in higher test scores, better teaching or faster learning, the question should be a wake-up pinch for cheerleading corporate executives and parents.”

These opposing views lay a foundation for further discussion into the pros and cons of ICT use in schools.

## **1.7 ICT and Thinking**

In the Futurelab Literature Review on Thinking Skills, Technology and Learning (Wegerif 2002), the point is made that successful thinking skills programmes have a variety of strategies, habits, attitudes, emotions, motivations and aspects of character development. These thinking skills are not based on just one psychological theory and are thought to improve the effectiveness of the students' thinking. This fits in well with the holistic view of the Key Competencies. This also aligns with the OECD approach of including the Thinking Key Competency as a cross cutting competency.

The report also outlines three ways that information technology can be used to teach thinking skills. ICT can be a tutor, a provider of mind tools and a support for learning conversations. Again, the technology by itself does not lead to transferable thinking skills. The role of the teacher is critical along with the students having knowledge of what skills they are learning. The modelling and use of these skills in different contexts is seen as a key.

## 1.8 Conclusion

The Key Competencies are clearly going to be fundamental building blocks in the revised curriculum in New Zealand and, given their genesis in OECD policy generally, they may well be pivotal in preparing students for productive citizenship in the developing 'knowledge society' worldwide. The 'knowledge society', it seems, is to be fuelled by the students of today and tomorrow and embedding these Key Competencies will inevitably be a significant pedagogical challenge facing teachers in New Zealand and the world in the next few years.

A dilemma for educators in their everyday teaching will inevitably be the whole question of what to 'measure' or 'assess' in relation to the Key Competencies and how to tell whether or not students are acquiring and demonstrating them in classrooms. The material provided in the curriculum statement is fairly broad and vague on this. It allows schools to develop their own emphasis and flavour in 'assessing' or identifying the Competencies. However, this may lead to both poor and rich interpretations of the Key Competencies. If teachers are to effectively foster the development of the Key Competencies in their students, professional development for teachers will be crucial and perhaps time and resources will need to be given to facilitate programme development within schools.

The knowledge society has been born and fuelled by ICT. Knowledge is now plentiful, one needs only to examine the evolution of the online encyclopaedia "Wikipedia" to see that information has the potential to be stored, accessed, organised, reorganised collaboratively and at pace. ICT is at the forefront of change and the ability of knowledge to flow around the globe means further changes will occur at an ever increasing pace. The benefits of the knowledge society are not yet completely clear and there is some concern about the driving forces behind ICT development and school implementation. The need for students to participate in the economy and continue the ICT momentum is a driving factor for its implementation. Some research points to ICT motivating students and the ease with which students become familiar with and use technology reinforces this point. ICT that is introduced to students without a pedagogically sound platform is not of the same educational value as ICT used with purpose. ICT used to motivate, excite and bring a sense of accomplishment by involving real life tasks is more likely to develop 21<sup>st</sup> century thinkers. ICT and the Key Competencies can be worked together to develop and interest students in their areas of passion.

My e-Learning Fellowship project, therefore, was an attempt to pull together both Key Competencies and ICTs; to investigate characteristics of '21<sup>st</sup> century learning outcomes' in the context of 21<sup>st</sup> century learning media. I wanted to know what Key Competencies might or might not be demonstrated or fostered in some ICT-based learning activities in a secondary school context. I wanted to observe them 'in action', and from these observations look at the factors that may enrich Key Competency implementation in ICT-mediated learning activities.

## **CHAPTER 2: Research Question and Methodology**

### **2.1 What It Is That I Want To Find Out**

What I wanted to do was to find out how some of the Key Competencies: Self Management, Participating and Contributing, and Thinking could be identified in classroom lessons and, in particular, how to do this in lessons involving ICTs.

I was also interested in the learning outcomes when students used ICT and how this was linked to the Key Competencies. My main question was, “What are some of the Key Competencies demonstrated when secondary students use ICTs in different learning contexts?”

### **2.2 Research Setting**

The research took place in a small, decile 4, semi-rural school. The school is developing its ICT capabilities as various needs in the school arise.

### **2.3 Methodology**

My research project took a participant case study approach; the 'cases' being a series of ICT based activities undertaken by a group of mixed to upper ability Year 10 students. The case study approach is part of the qualitative research tradition.

This project had two phases - the first an initial trial that involved a range of subjects to determine the indicators that might be observed and the second phase a more in-depth analysis of the indicators in subsequent student activities. The second phase included both the online forum and Wikipedia activities. The project I undertook focussed on two ICT based learning activities. These activities included an online forum in Terms One and Two and a four week project in Term 2, developing Wikipedia sites based on our local geographical area. These two ICT activities comprised the case studies for my project. I also taught the class, while observing and gathering data from a number of sources.

### **2.4 Sampling**

The Year 10 class of 28 students that I chose to work with was a class that I had taught Science to in the previous year. This meant that I had a good knowledge of the individuals in the class and a relationship with them. This may be a factor that needs to be taken into account when looking at the research results.

I had decided to teach a topic based around the idea of developing a Wikipedia site that was already present on Wikipedia, in the form of a stub. A stub is a small article that contains only a few points and is not yet classified as a full encyclopaedia article.

I had decided to allow the students in the class to form their own teams of three. I made the suggestion that they aim for a mix of genders and strengths in different areas, such as creativity, computer skills and so on. The students formed teams and from that I decided to follow two teams more closely by videoing them each period. The two teams, (called Team 3 and Team 7) that I chose were mixed gender; both teams had one boy and two girls. They were also mixed ability and not the top students in terms of ability or attitude, with the exception of one of the boys in Team 3.

Qualitative research within the boundaries of the social sciences has been described as research focussed on social and cultural phenomena, meaning how and why people perceive, interpret and act as they do. (Myers 1997), (Gephart 1999), (Schostak 2003)

There is a subjective nature to this type of research and rather than 'facts' per se, I will look for patterns, impressions and themes that run in and through my collected data.

My research project, therefore, may be described as a subjective perspective of how Key Competencies may be observed during a unit of work, the learning outcomes when ICT is used with a class and how these relate to the Key Competencies.

The data I collected by video lent itself to quantitative and qualitative analysis. Two groups were monitored throughout the unit of work that I taught and indicators were recorded minute by minute. This data was to be analysed to show any emerging patterns that prove to be of interest.

In my project, I had decided to set a unit of work based around the social software, Wikipedia. I developed the unit of work and taught it, with the classroom teacher(s) present as I did so. I was totally involved in the development of the lessons and the approach to my teaching. I did not, however, specifically teach to develop the Key Competencies or adjust my usual teaching style. I was indeed a participant in the research but did not seek to pre-empt any particular outcomes, other than those of the development of the Wikipedia site itself.

## **2.5 Case Study**

Yin and Campbell (Yin and Campbell 2003) state that:

"As a research strategy, the case study is used in many situations to contribute to our knowledge of individual, group, organisational, social, political and related phenomena."

They go on to say that the case study method allows researchers to retain the holistic and meaningful characteristics of real life events.

This project is a case study and, as such, does not focus on discovering absolutes or universal laws. It aims to explore and describe a limited situation, allowing

"a researcher to reveal the multiplicity of factors which have interacted to produce the unique character of the entity that is the subject of the study" (Haigh 1999:1)

My case study involved two ICT tasks that included an online forum and a four week unit of work based on the social software, Wikipedia. I was interested in observing the Key Competencies in situ, finding out what and how the Key Competencies could be observed in the classroom and in the online forum contexts. The research will hopefully be a useful step for me, my school and other educators as we begin to develop programmes to incorporate the Key Competencies into our teaching.

## **2.6 Methods**

### **Pre-Trial:**

I observed a number of periods informally during Term 1 and visited a range of subject areas.

### **Initial Trial:**

I undertook an initial trial that observed the class in one subject area to see how easy it was to map the thinking that occurred during a task/lesson using the Solo Taxonomy. I included at least one ICT activity in the 6 lessons that were formally observed.

### **Data Collection:**

During Term 2, I planned a 4 week unit of work around developing local Wikipedia sites for the Hauraki Plains and Ngatea. I also used the interactive gaming program “Kar2ouche” to allow the students to evaluate themselves at the end of the unit. The focus of the self evaluation was the Key Competencies.

### **Online Forum:**

I started this in Term 1 and asked core teachers to take turns posting questions on the forum week about, until the end of Term 2.

<b>Research Questions</b>	<b>Indicators / (Analysis framework)</b>	<b>Data Sources</b>	<b>When / How Often</b>
<p><b>Main Question</b></p> <p>What are some of the Key Competencies demonstrated when secondary students use ICTs in a range of subject areas?</p>	<ul style="list-style-type: none"> <li>• Thinking</li> <li>• Managing self</li> <li>• Contributing and participating</li> </ul> <p>Detailed list to be determined by the pilot</p>	<p>Series of observations that will be video taped</p>	<p>Term 1: Week 5 till the end of the term</p>
<p><b>Sub Questions</b></p> <p>➤ What aspects of thinking can be identified and may be developed during a Wikipedia activity and an online forum?</p>	<p>SOLO taxonomy (<i>Biggs &amp; Collis 1982, Biggs 1996</i>) will be used to observe students' thinking:</p> <ol style="list-style-type: none"> <li>1. Pre-structural <ul style="list-style-type: none"> <li>▪ <i>Confused or irrelevant responses</i></li> <li>▪ <i>Responses do not relate to the question</i></li> <li>▪ <i>Does not remember the question</i></li> <li>▪ <i>Says, "I don't know"</i></li> <li>▪ <i>Restates the question</i></li> <li>▪ <i>Makes a guess as to what response is required</i></li> <li>▪ <i>Wishes to finish quickly without even considering the problem</i></li> </ul> </li> <li>2. Uni-structural <ul style="list-style-type: none"> <li>▪ <i>Makes use of one relevant point or feature</i></li> <li>▪ <i>Generalises in terms of one aspect</i></li> <li>▪ <i>Finishes quickly</i></li> <li>▪ <i>Conclusions inconsistent</i></li> <li>▪ <i>Jumps to conclusions on one aspect</i></li> </ul> </li> </ol>	<p>Observations using video and audio</p> <p>Student interviews</p> <p>Learning documents such as:</p> <ul style="list-style-type: none"> <li>▪ Unit Plan</li> <li>▪ Lesson Plans</li> <li>▪ Assessment tasks</li> <li>▪ Student evidence</li> <li>▪ Rubrics</li> <li>▪ Timetables</li> </ul>	<p>Term 2: Weeks 4 - 6 observe one group in detail</p> <p>At the end of the unit interview the selected students</p> <p>Collect all of these</p>

<b>Research Questions</b>	<b>Indicators / (Analysis framework)</b>	<b>Data Sources</b>	<b>When / How Often</b>
	<p>3. Multi-structural</p> <ul style="list-style-type: none"> <li>▪ <i>Involves two or more relevant points or features but does not link them which may result in inconsistency especially when drawing conclusions.</i></li> <li>▪ <i>Generalises in terms of a few limited aspects.</i></li> </ul> <p>4. Relational</p> <ul style="list-style-type: none"> <li>▪ <i>Involves and relates two or more relevant points or features and gives an overall concept or principle.</i></li> <li>▪ <i>Generalises well within a given context.</i></li> <li>▪ <i>No inconsistency within a given context, but may be when going into other contexts.</i></li> </ul> <p>5. Extended Abstract</p> <ul style="list-style-type: none"> <li>▪ <i>Involves recognising alternative approaches and searching for alternative explanations.</i></li> <li>▪ <i>Evaluates and improves</i></li> <li>▪ <i>Generates new approaches</i></li> <li>▪ <i>Meta cognition, recognises cross curricular links, (transfer).</i></li> </ul> <p>Other possible analysis indicators from the ministry document on Key Competencies:</p> <ul style="list-style-type: none"> <li>▪ Reflective thinking - thinking about thinking</li> <li>▪ Researching</li> <li>▪ Organising</li> <li>▪ Evaluating</li> <li>▪ Information-processing</li> <li>▪ Reasoning</li> <li>▪ Enquiry skills</li> </ul>	<p>Responses to the online forum.</p> <p>Follow-up interviews with students who have used the forum:</p> <p>(a) frequently (b) spasmodically (c) not at all</p>	<p>At the end of Terms 1 &amp; 2</p>

<b>Research Questions</b>	<b>Indicators / (Analysis framework)</b>	<b>Data Sources</b>	<b>When / How Often</b>
<p>➤ What aspects of managing self can be identified and may be developed during a Wikipedia activity and an online forum?</p>	<ul style="list-style-type: none"> <li>▪ Acting appropriately</li> <li>▪ Ability to reflect</li> <li>▪ Setting personal goals</li> <li>▪ Making plans</li> <li>▪ Striving for excellence</li> <li>▪ Resourceful</li> <li>▪ Resilient</li> <li>▪ Strategies to overcome hurdles</li> </ul>	<p>Observations using video and audio</p> <p>Student interviews</p> <p>Learning documents such as:</p> <ul style="list-style-type: none"> <li>▪ Unit Plan</li> <li>▪ Lesson Plans</li> <li>▪ Assessment tasks</li> <li>▪ Student evidence</li> <li>▪ Rubrics</li> <li>▪ Timetables?</li> </ul> <p>Responses to the online forum.</p> <p>Follow-up interviews with students who have used the forum:</p> <p>(a) frequently (b) spasmodically (c) not at all</p>	<p>Term 2: Weeks 4 - 6 observe one group in detail</p> <p>At the end of the unit interview the selected students</p> <p>Collect all of these</p> <p>At the end of Term 2</p>

<b>Research Questions</b>	<b>Indicators / (Analysis framework)</b>	<b>Data Sources</b>	<b>When / How Often</b>
<p>➤ What aspects of 'contributing and participating' can be identified and may be developed during a Wikipedia activity and an online cross curricular forum?</p>	<ul style="list-style-type: none"> <li>▪ Taking an active part in the classroom and online forum</li> <li>▪ Being confident to become active participants in contexts that are new to them</li> <li>▪ Participation may involve being online but not necessarily contributing to the forum</li> <li>▪ Participating in groups on set tasks</li> <li>▪ Balancing rights, roles and responsibilities</li> </ul>	<p>Observations using video and audio</p> <p>Student interviews</p> <p>Learning documents such as:</p> <ul style="list-style-type: none"> <li>▪ Unit Plan</li> <li>▪ Lesson Plans</li> <li>▪ Assessment tasks</li> <li>▪ Student evidence</li> <li>▪ Rubrics</li> <li>▪ Timetables?</li> </ul> <p>Responses to the online forum.</p> <p>Follow-up interviews with students who have used the forum:</p> <p>(a) frequently (b) spasmodically (c) not at all</p>	<p>Term 2: Weeks 4 - 6 observe one group in detail</p> <p>At the end of the unit interview the selected students</p> <p>Collect all of these</p> <p>At the end of Terms 1 &amp; 2</p>

## **2.7 Data Collection**

Data was collected in the following ways:

A pre-trial observation for four weeks during Term 1, across a range of subject areas.

A review of the literature on the Key Competencies and ICT.

Video analysis of two groups, in Term 2, during the four week period that the unit was taught. This consisted of three hours per week for each of the two groups, over the four week period. A total of approximately twenty four hours of video analysis. For a sample of a minute by minute data analysis sheet, see Appendix 3.

Structured interviews at the end of the four week topic, with the subject teachers who were present with me as the class worked on the Wikipedia unit of work.

Structured interviews at the end of the Wikipedia activity with students from the two observed teams.

Structured interviews with six students, who were involved to varying degrees, with the online forum that spanned Terms 1 and Term 2.

Personal observations recorded in a learning journal throughout the project.

Examples of student work.

Online forum conversation strands.

## **2.8 Data Analysis**

The main technique I used to analyse data was mixed quantitative and qualitative analysis. I triangulated data from a variety of sources. The sources included video analysis, recorded indicators in the three Key Competencies observed, structured interviews with the teachers and students, student work and recorded events from my perspective in the form of an on-going log.

I compared the data from these sources and looked for patterns and stories related to how the Key Competencies were evident. The data were examined in the light of the learning outcomes that seemed to have come from using the ICT chosen for this project. The indicators I had chosen to use to record the Key Competencies had come initially from the ministry document and from observations in the classroom during the pre-trial part of my project. The pre-trial aspect of my project involved observations in Term 1 where I visited a range of subjects including Science, Social Studies, Mathematics and English. During some of the periods that I took observations, ICT was a component or a focus of the lesson but my main focus was to see what indicators of the Key Competencies might be apparent in classroom activity.

I looked for demonstrations of the three Key Competencies - Participating and Contributing, Thinking and Self Management. In particular, I was interested in how these competencies might be demonstrated in the classroom. This approach may have been slightly narrow but was a useful starting point from which to categorise and

observe the relevant indicators. It can be seen that the possibility exists for an action to be placed in more than one of the indicators, listening at the appropriate time is also acting appropriately. This was recorded in the quantitative data.

The categorisation of the observed Key Competency - “Self Management” that emerged was as follows:

Acting Appropriately	(AC)	e.g. Acting appropriately or getting to class on time.
Internalised Attitudes	(IA)	e.g. Resourceful or showing an interest in learning.
Future Indicators	(FI)	e.g. Makes plans or striving for excellence.

The “Participating and Contributing” Key Competency indicators could be divided into the following categories:

Active Participants in New Contexts	(AP)	e.g. Engagement or enjoyment of tasks.
Group Roles and Responsibilities	(GR)	e.g. Participation in groups.
Classroom Contribution	(CC)	e.g. Answering questions in class or bringing ideas from home.
Group Participation	(GP)	e.g. Helping others or listening.

The “Thinking” Key Competency I looked at in two ways; using the Ministry guidelines, I used the following broad categories:

Critical Thinking	(CT)	e.g. Reflective thinking about self.
Information Processing	(IP)	e.g. Researching or providing evidence.
Reasoning	(RE)	e.g. Describing or explaining.
Creativity	(CR)	e.g. Generating original ideas or products.
Evaluation	(EV)	e.g. Editing and correcting work.

These appeared to be sensible categories to use based on the curriculum statements and observations. The full list of indicators for the chosen Key Competencies can be seen in Appendix 2.

And using the SOLO taxonomy (Biggs and Collis 1982), I categorised the types of thinking that were observed. The SOLO taxonomy is a scale that describes the complexity of thinking and is valuable as it can be used in different contexts and different subjects. A five level scale can be used that describes the learning outcomes of students.

SOLO taxonomy (Biggs & Collis 1982)

### 1. Pre-structural

*(Confused or irrelevant response, responses do not relate to the question, does not remember the question, says “I don’t know”, restates the question, makes a guess as to what response is required, wishes to finish quickly without even considering the problem.)*

### 2. Uni-structural

*(Makes use of one relevant point or features, generalises in terms of one aspect, finishes quickly, conclusions inconsistent and jumps to conclusions on one aspect.)*

### 3. Multi-structural

*(Involves two or more relevant points or features but does not link them which may result in inconsistency especially when drawing conclusions, generalises in terms of a few limited aspects.)*

#### 4. Relational

*(Involves and relates two or more relevant points or features and gives an overall concept or principle, generalises well within a given context. No inconsistency within a given context, but may be when going into other contexts.)*

#### 5. Extended Abstract

*(Involves recognising alternative approaches and searching for alternative explanations, evaluates and improves, generates new approaches, meta-cognition, recognises cross curricular links, (transfer).)*

Hattie and Brown (Hattie and Brown 2004) suggest that individual questions to invite responses be written at each level and that all levels be covered. SOLO has been used in most cases to analyse written responses from formal assessments in the empirical-analytical tradition. It has been used for verbal evidence but more than a brief response is needed to determine the three more complex levels.

I have used the SOLO taxonomy to code responses of students seen from video evidence, a slightly different approach.

### 2.9 Data Validity

With all research projects there are potential issues of data validity. This project therefore needs to be considered with the following points kept in mind.

#### **Context:**

Students in this class remained together but were taught by one teacher for the four week block. Their normal subject teachers were present and participated by answering student questions and helping out in the classroom. Although the class size of twenty eight is common for high school classes of this type, generally only one teacher would be present. This may have had some influence on the dynamics of the classroom.

#### **Teacher Participation:**

I have a good relationship with this class, having taught them last year as a Year 9 class. The way that I related to the class and my classroom practice may have had some bearing on the behaviour and work ethic of some students.

The project focused on the observation of Key Competencies with the use of ICT and the learning outcomes when ICT was used.

I taught the class in my normal way - fairly teacher directed and with set goals required each period. Both my approach to teaching and the relationship that I had with the class needed to be considered as I interpreted the evidence.

#### **Activity:**

I had decided to structure an activity, the Wikipedia unit of work, that did not require prior subject knowledge and by its nature might elicit group response. I did not consciously predetermine or teach the Key Competencies as I worked through the unit.

The online forum was designed to allow students to participate in an activity that may have been new and different to them. I did not make this compulsory or make the students participate; I did encourage them to do so and provided small rewards for them contributing to the site. Questions were devised by their core teachers and I did request that the questions be open so that more responses would be possible from the students.

I took a number of steps to keep the analysis of collected data as accurate as possible:

I endeavoured to triangulate evidence from video analysis, student interviews, teacher interviews and my log book to verify indicators and generalisations that I have made concerning the vignettes relating to the Key Competencies and ICT.

My research has been open to all stakeholders and interested personnel at all times. I have been able to share with classroom teachers and senior management throughout the project. I have also asked a number of people to comment on the draft write-ups of the project.

## **2.10 Ethical Approval**

As with any research project there are associated ethical issues. Consideration of the parties involved, including the school is important and the rights of these individuals are paramount. Teacher-researcher Marian Mohr states it this way, cited by Zeni, J. (1998): “Teacher researchers are teachers first. They respect those with whom they work, openly sharing information about their research. While they seek knowledge, they also nurture the well-being of others, both students and professional colleagues” (Mohr 1996).

### **Informed Consent:**

Before beginning my research project I ensured that the main aims and objectives of the project were made available in the form of a letter to all participants of the class I was to work with, teachers of that class and the Principal. The letter included contact details of the supervisor of my project and me, should there be the need for further discussion. I obtained permission from the students involved, teachers and Principal to gather and use video, interviews and other data in my project.

### **Confidentiality:**

All participants in the project have remained anonymous although some reference to my school will be made to link the development of the Key Competencies school-wide with the observed competencies in the classroom.

### **Storage of Data:**

All materials including video, work samples, photos, and notes will be kept for a three year period. The video and audio provides evidence and verification of what took place during the Wikipedia unit of work. The transcripts of the online forum provide a date record and evidence of the questions and answers that were provided to the class. When the three years are up evidence will be destroyed.

### CHAPTER 3: Case 1 – Online Forum

The online forum was started early in Term 1. The idea was to allow teachers and students the opportunity to contribute to this forum in a low key, non enforced way. I decided not to make participation compulsory, instead wanting students and teachers to participate and contribute on their own terms.

#### 3.1 Task Initiation

To initiate the forum, I used the fictitious character Moriarty, from the Sir Arthur Conan Doyle novels about Sherlock Holmes. The online forum was introduced during a Social Studies period early in Term 1. The class were taught how to go onto the forum and begin a forum discussion, add a comment and access the site from home. I decided to use Schoolzone as it afforded the protection of keeping the discussion within the class and provided a secure and safe site which could be accessed from home.

Moriarty, the fictional character, was introduced as a topic for discussion. This tied in with the work the class had been doing on character and plot development in English. The questions revolved around “Who is Moriarty” and “Find out about him.” The initial contributions to the online forum during the Social Studies period consisted mostly of social interactions and “chat”. The challenge was given to the class to find out about Moriarty and contribute to the forum.

Interest in Moriarty was present in the days following the introduction of him as a character. Students began to discuss the question within the forum as soon as he was introduced, as shown by this excerpt from the online forum:

Table 1: Online Forum Comments on Moriarty

<b>Student 1</b> <b>Thu 16 Mar 2006</b> <b>12:48 pm</b>	is that fulla even real????? <a href="#">Reply</a> <a href="#">Edit</a> <a href="#">Delete</a>
<b>Student 2</b> <b>Thu 16 Mar 2006</b> <b>12:48 pm</b>	i dun get this..... <a href="#">Reply</a> <a href="#">Edit</a> <a href="#">Delete</a>
<b>Student 3</b> <b>Thu 16 Mar 2006</b> <b>12:49 pm</b>	he's my best freind <a href="#">Reply</a> <a href="#">Edit</a> <a href="#">Delete</a>
<b>Student 3</b> <b>Thu 16 Mar 2006</b> <b>12:49 pm</b>	hu is he <a href="#">Reply</a> <a href="#">Edit</a> <a href="#">Delete</a>
<b>Student 4</b> <b>Thu 16 Mar 2006</b> <b>12:52 pm</b>	neither do i Student 2

At the end of the practical component of the project, in Week 8 of Term 2, I interviewed selected students about the online forum activity. Moriarty again appears out of no where.

**Me:** “What did you like about it?” (The online forum)

**Student 5:** “I liked the Moriarty thing, but it was kind of gay when we found out he wasn’t real. Um, it was just something to do and it was an excuse to get on the computer as well.”

Again later in the interview the same student comments when posed the question, “Why were you interested in the online activity?”

**Student 5:** “It was fun but you know, it started off with Moriarty, and everyone was trying to find out who he is. You do, and it’s building on that and all the other questions. I was just interested.”

Student 5 was a consistent contributor to the online forum and found out about Moriarty. Moriarty responded to keep the thread of the conversation going.

Table 2: Online Forum Comments about Moriarty

<p><b>Student 5</b> <b>Fri 17 Mar 2006</b> <b>12:18 pm</b></p>	<p>sherlock holmes arch-enemy. his name is actually james moriarty. hes not a real man, he only exists in fiction. try this site <a href="http://en.Wikipedia.org/wiki/Professor_Moriarty">http://en.Wikipedia.org/wiki/Professor_Moriarty</a></p> <p>he was a professor of mathematics, and a crimelord. his aliase is the napolean of crime. he lived in london and was a criminal genius. he died at Reichenbach Falls by the hand of sherlock holmes. or did he? its not for sure whether he died or not, but quite possibly not if hes in this site with us...</p> <p>he was the author of The Dynamics of An Asteroid, a book so advanced that "no man in the scientific press is able to criticize it". he was one of the worlds first supervillians. the book he first appeared in was written in 1893, so hes eral old now... ummm, yeah. real old alright. heres where i got all this info <a href="http://www.internationalhero.co.uk/m/moriarty.html">http://www.internationalhero.co.uk/m/moriarty.html</a></p> <p><a href="#">Reply</a> <a href="#">Edit</a> <a href="#">Delete</a></p>
<p><b>Professor Moriarty</b> <b>Fri 17 Mar 2006</b> <b>1:24 pm</b></p>	<p>Good, very good... not a bad start. Try and see if you can include some quotes from the propaganda that the author wrote (who is he?) Do you like this character? You have only just begun.</p> <p><a href="#">Reply</a> <a href="#">Edit</a> <a href="#">Delete</a></p>

<b>Student 5</b>  <b>Fri 17 Mar 2006</b> <b>4:31 pm</b>	<p>It's not the man himself, but a clone -- as evil as the original, I'm afraid.  -- Holmes, "The Crime Machine"</p> <p>omg, i just found out that moriarty isnt a man, but a clone... he was cloned when sherlock killed him, by some evil genetic dude. he then implanted moriarty 1's memory into moriarty 2. so its the same man... i guess. but hes lived twice, had two lifetimes to perfect his evil schemes and whatnot. scary, huh?</p>
--	--

The advantage of using a fictional character to engage the students was obvious and seemed to be a good way to introduce the online forum to the class, as well as get a conversation going about the Conan Doyle stories and characters.

The on-going nature of the forum requires high input levels from the initiator to keep the momentum going. I encouraged students to contribute to the forum by using a number of methods.

I visited the class during their form (whanau) time at the beginning of each day and gave a mini Moro bar to those who had participated the previous day.

I talked to individuals and the class as a whole to encourage them to take part in the question/s that had been recently posted.

I continued to post the address and give it to the students on an on-going basis.

Despite these efforts only a small to moderate number of students contributed consistently to the online forum. When I was away on professional development and during the holiday period contributions to the forum decreased markedly.

The idea of the forum, after the initial introduction of Moriarty, was for students to answer questions posed by their subject teachers. The four subject teachers were asked to post questions on a rotational basis. I helped the teachers put their question on the forum, as most had not done this before. I asked that the questions be relatively open to encourage discussion.

Two of the four teachers made ongoing comments on the forum. These comments were made to encourage or tease out more information from the students who had made the effort to contribute. The following online comment was part of a topic conversation developed by the English teacher around the theme, "What is our identity as New Zealanders?" It can be seen that this teacher encourages and interacts with the students.

Table 3: Teacher Encouragement

<b>Teacher 3</b>  <b>Thu 06 Apr 2006</b> <b>5:11 pm</b>	<p>I am afraid I agree with student 5 and student 6 - I am not particularly thrilled about anyone mistaking our flag for an Australian one ( our national identity is completely different to theirs, as should be our flag). However, what is yet to be decided is - how could our national identity be represented?</p>
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There remains the question as to why more students did not participate in a more consistent manner. Informally speaking to a range of students, I had the impression that some students were not that computer literate and this was a limiting factor for them. Others seemed to have forgotten the IP address and really did not have a high motivation for wanting to buy into the activity. A few students explained that their computers needed to get fixed or they were not on internet. Despite this, some students also contributed to the online forum during other school periods. This was not encouraged! I think that the free choice I gave, with contribution not being formally recognised or insisted upon could also have been a factor limiting contribution. For students who did participate and for those interviewed, the activity was seen as an enjoyable learning experience.

### **3.2 Student Buy In**

This was a problem as only a small number of students actively became involved in an on-going manner. I felt that the quality of responses improved as the forum became more established; however, the number of students who contributed did not increase. Not having made it part of their course requirements seemed to limit the number of participants.

The following comments by teachers were made about the student buy in.

Here the teacher suggests that it could be used as a homework activity with the caution of possible access issues.

**Me:** “Disadvantages of the online forum?”

**Teacher 1:** “Well, I guess just the access to it. ‘Cause as I said there seems to be only 4 or 5 that are regularly using it.”

**Me:** “It’s getting the buy in really, isn’t it?”

**Teacher 1:** “Yeah, seeing the value of it. Um, so, if it was made sort of as a homework activity - but then you can’t disadvantage the kids that don’t have access to it.”

Another teacher came up with the idea of prizes, which I had already decided to use as a motivator.

**Me:** “How do you think you could get them to buy into it more? ‘Cause that’s something that I found tricky.”

**Teacher 2:** “Give prizes.”

**Me:** “Yeah, I did that, too.”

**Teacher 2:** “It still didn’t work? I think it is the only thing at this stage.”

Interestingly, the following teacher links student motivation with participation in the online forum. A discussion followed about the present nature of assessment in the secondary school system and how students tend to see value in credits as extrinsic motivators rather than learning for the joy and interest of it.

**Teacher 3:** “Well some kids just couldn’t be bothered, to motivate all the kids to be part of it. We had the same kids each time and others were just never going to be bothered doing it.”

**Me:** “And I didn’t want to actually make it worth credits or make them do it.”

**Teacher 3:** “You shouldn’t have to.”

**Me:** “I know, I wanted it to be something that they thought they could buy into without that. I did go with the prize motivation, but, yeah.”

**Teacher 3:** “Yeah, it’s a shame because I think that’s another downfall of the secondary system is that we have got them thinking that everything has to be worth credits and how often are we asked that? We are often asked, “Is it, what’s it worth?””

**Me:** “Well, I was asked through that unit, “Is this worth credits?””

Students also had some comments to make about buy in, with possible solutions to improve it being posed.

The following interview excerpt gives some of the problems that students thought could have limited the participation by others.

**Me:** “What were you going to say in terms of how you could get others involved or how could you improve the activity?”

**Student 7:** “I don’t know; maybe give some class time for it.”

**Me:** “So that would help to snow ball it a bit more?”

**Student 8:** “It’s kind of hard, ‘cause with some of the homework we get; some of us don’t really get time to go on it.”

**Me:** “Right.”

**Student 6:** “And with the buses, by the time we get home its 5 o’clock.”

**Me:** “And then you’ve got other homework that’s happening as well.”

**Student 8:** “Yeah, it’s just pretty hard.”

In another interview, with different students, we find the idea of providing class time being suggested to obtain a higher level of buy in and also the idea that not all students enjoy going on computers.

**Me:** “Okay, were there any improvements that could have been made to help how you and others get involved in this activity? What are these? I mean how could you get other people involved?”

**Student 10:** “Tell them about it. Some people just don’t go on computers, they just don’t want to.”

**Student 5:** “You could have allocated school time; set aside a lesson. Everyone could have got on there.”

Another interesting solution involving form (whanau) time was posed by one student.

**Student 8:** “I don’t know? Get more people on; it would be just like easier because we need to have more opinions. More people’s opinions in there on how they feel about something.”

**Student 6:** “Maybe in whanau time, if we logged onto the computers, we could just go have a look in groups. Small groups of three, we could just stand around a computer and have a look.”

**Me:** “You could talk to your whanau teacher about that. That’s a good idea, a very good idea.”

### **3.3 Key Competency Indicators**

During Term 1, I observed the Year 10 class in a number of different subjects. My main objective was to record events and look for Key Competencies that were present in the classroom. Using both the information that I gained from the above process and the indicators given in the Draft Curriculum, I began to record the indicators that were displayed by students. I augmented and developed some of the categories using indicators from other sources. e.g. The creativity indicators in the Thinking Key Competency were taken from the New Zealand Council of Educational Research Scales, 1996.

The indicators are a first look at the practical problem of how to observe the Key Competencies while also teaching a class. They may be somewhat limiting and the potential arises for other indicators to be included in the list, depending on the context in which these indicators will be looked for. The Key Competencies will be more than likely to develop differently in different contexts and in different localities. I have begun the process of identifying them using the two ICT contexts that I performed with the class.

### **3.4 Online Forum and Self Management**

The students who contributed consistently to the online forum showed a high level of Self Management. They made opportunities in their own time to participate and answer questions. The three Self Management categories used in the classroom; Action

Indicators (AC), Internalised Attitudes (IA) and Future Indicators (FI) could be used to monitor Self Management in the online forum with some important points to consider.

One of the students interviewed about the online forum did not make any comments online even though he had the opportunity. He did, however, read and take interest in the forum topics. His experience of the online forum was, in fact, quite positive. The following quote comes from him during a structured interview.

**Student 7:** “I didn’t actually put any answers up but I read most of the questions. It’s just interesting to see everyone’s views. What they think about things.”

Unless I had interviewed this student I would not have realised that they had shown Self Management skills by going online and looking at the responses others had made. What learning has taken place in that student? - The potential to consider other points of view or gaining knowledge from the responses of others. Students may research answers without writing them down on the forum. There is a danger of teachers making assumptions based on the evidence present and without consideration of the wider situation.

Other students had access problems; some of these problems were technical issues. Some students, for example, had computers that were said to be “broken”, others were not allowed to go online and yet others did not have home access to the internet. These issues would need to be addressed and an equitable solution found should the online forum be used as evidence of the Key Competencies.

### **Action Indicators (AC)**

Evidence of acting appropriately was seen in most of the responses given, with about 90% of the interactions being on task. Only a few responses were inappropriate and this was because they were off topic and of a “social” nature. This aspect of the online forum was annoying to the hard core participants.

The following comments were made in response to things that annoyed participants.

**Student 6:** “Yeah, I’d have to agree with that. Some people just go on there and do something that is totally unrelated, irrelevant and nothing to do with anything. Like none of the topics.”

**Student 8:** “And you get people that just say something that had nothing to do with the question or answer.”

Completing tasks and taking responsibility, as action indicators, could also be considered when using the online forum. It is possible that students be put in charge of question strands and given the responsibility to encourage participation.

### **Internalised Attitudes (IA)**

The ability to reflect was mentioned by a number of the students who were interviewed about the online forum. The following student, for example, discusses the reflection that

occurred concerning a fixed point of view that she held when the discussion started and how she changed viewpoint after alternative points were put forward.

**Student 5:** “No, but I thought it was awesome because when someone puts it in writing then you take it more seriously. Like when we were having that whole flag discussion, I mean if someone was telling you, you just really be out to defend your own point. But reading that, I thought we should change the flag originally, and then reading everyone else’s, I kind of changed tack. But I wouldn’t have, because you know, if **Student 6** was talking to me about it, it would be like no, no, they should change it, what are you on about. Like, yeah, you can just read it and think about it.”

Resourcefulness could be shown as students overcome difficulties with getting on to the forum. The other indicators such as showing resilience, overcoming hurdles, showing an interesting in learning, working independently and showing initiative could be evidenced in the process of giving a commitment and contributing to the online forum. Although again, accessing the site without actually contributing to it may show attitudes that are positive and contribute to the student’s learning.

The consistent online contributors could be classified as having resilience as they continued to participate despite the small numbers of other class members who made a commitment. The interest in learning was evidenced in some of the online discussions that centred on topics that were more popular. The “What is our National Identity” topic tended to be well subscribed to and a learning experience as evidenced by the feedback from the online interviews as shown in the above interview excerpt. Making the time to post a reply was taken as an example of working independently. This was shown by the contributors to the forum and also by those who went on to see other people’s points of view.

Showing initiative could be a little more difficult to observe. This might present itself if, for example, students are made responsible to initiate and maintain an online forum, overcome problems in a novel way or participate above and beyond expectations.

### **Future Indicators (FI)**

The three indicators I included in this category were setting personal goals, making plans and striving for excellence. These indicators were not strongly present in the online forum which tended to be dominated by functional instruction. We find only a few examples of these future indicators. These indicators would need to be built into the online forum activity. Setting personal goals could be an online discussion point where goals are discussed between teacher and student.

Making plans could be part of a group’s responsibility as they prepare for a research project, posting them onto an online forum to be reviewed by peers or teachers. Striving for excellence could be part of an on-going programme of helping students improve answers to questions grammatically, in content and in depth of thinking.

### 3.5 Online Forum and Participating & Contributing

The different context of the online forum, provided for this class, gave an opportunity for participants to be part of a new learning context. This class had not had much, if any, experience with an online forum.

The online activity sits well as one which could develop the Participation and Contribution Key Competency. A range of Key Competencies could also be developed and assessed, as has already been mentioned. Analysis of the forum discussions was undertaken and showed that a range of connections were made by students. On occasions, students related to each other on a social level. The following comment posted on a Science discussion shows that, at times, the forum was used to ask questions not related to the post.

Table 4: Social Question

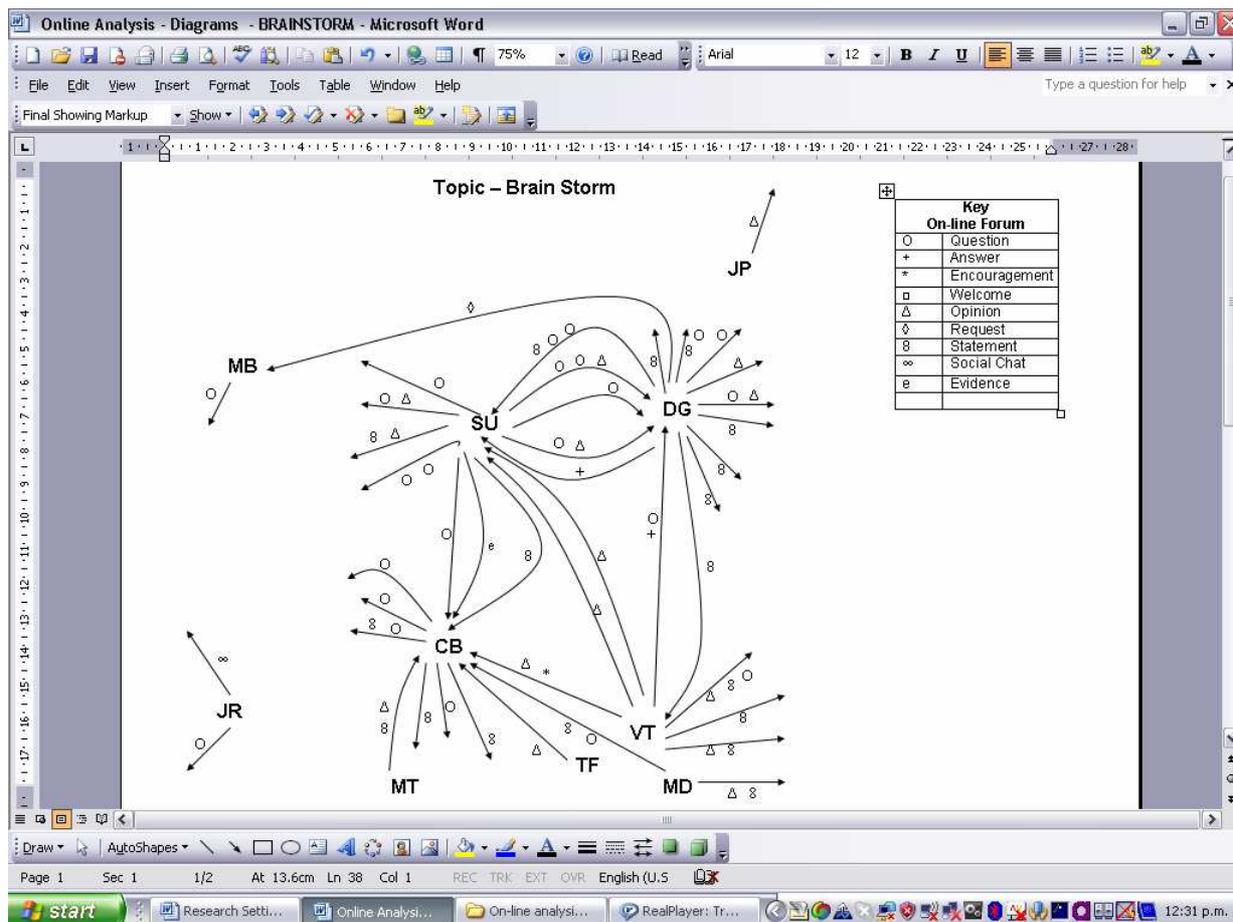
<b>Student 3</b> <b>Mon 24 Apr 2006</b> <b>8:07 am</b>	when does school start?
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At other times the students asked and answered questions related to the post. Most dominant were the interactions between students and teachers. However, there were interactions between students. This was referred to by a student in an interview.

**Student 8:** “People don’t really listen to you in class, like just the teacher. You get to read and then do that on an answer.”

An analysis of a forum discussion is shown below in Figure 1.

Figure 1: Analysis of an Online Forum Topic



From this online analysis, the two teachers DG and CB can be seen as actively relating to the students as they post onto the forum. A few connections can also be seen between students, for example VT and SU. A range of questions, opinions, answers and statements are made.

The Participating and Contributing Key Competency was broken into four main indicator categories. Some of these were not observed in the online forum due to it being set up as an activity for individuals. The four categories are symbolised by Active Participants (AP), Group Roles (GR), Classroom Contribution (CC) and Group Participation (GP).

Two of the categories, Group Roles and Group Participation, did not apply to this ICT activity, as they are group based indicators. It is possible that the online forum could be set up with groups giving their responses to various posed questions. Groups could plan online or be involved in a range of other activities. A fair system for marking each individual within that group would need to be devised. This again has the potential to be used as a collaborative learning activity and an opportunity to measure contribution by groups and within groups.

### Active Participants (AP)

At least two thirds of the students in the class contributed to the online forum at least once. One quarter of the class participated in three or more forums. A few students

were very active participants. There is a range of ways that this ICT activity could be used to facilitate a new context for the students.

One teacher makes an interesting case for it eventually being used in a broader way. The possibility of extending the students' thinking beyond our local area to understanding other people's view points on issues of student or global interest appeals to this teacher, as the following excerpt from an interview shows.

**Teacher 4:** "I'm not sure how many kids actually used it. I think the advantage is that you could use it for discussion with a class. Another advantage is that it could be used more throughout the schools, between classes in other schools, later on maybe globally. Especially when you are doing topics where people have different cultures and different values, beliefs of what's important. Thinking of something like the Amazon Rainforest, you know, you have people over there who live in that area who have a different view of the forest than we would. You would be able to get views from people right around the world and in that area would be great. So, that's one of the great advantages."

One student responded to the question, "What was different with the online forum compared to what you already do at school?"

**Student 7:** "Well, we don't do much of that sort of stuff; it was good."

**Me:** "So, it was new?"

**Student 7:** "Yeah, questions you could answer if you want to. It's good."

All six students interviewed about the online forum were positive about it. The idea of it being 'uncharted lands' and a 'novelty' was an attraction for the students who were interviewed. The following quotes from students point out some of the advantages and enjoyable aspects of the online activity.

Excerpt 1:

**Student 9:** "With the Treaty of Waitangi thing it was good because we're studying Treaty of Waitangi now; well, we were, in social. We could go back and look through it and..."

Excerpt 2:

**Student 5:** "I liked it because, you know, if we were asked that in class, all of us would be clueless but you could just research it."

Excerpt 3:

**Student 9:** "I was pretty much in it with the chocolate bars. Otherwise, I don't know, when I went on I didn't think it would be that great, but since I was bribed then, yeah, went on and it was actually pretty good in the end."

Excerpt 4:

**Student 8:** "Well, I reckon it was very good. Everyone can make and participate in it."

Excerpt 5:

**Student 6:** “It’s an easy way to get my opinion out there. Without speaking in class, and people don’t talk like that in class. People may mention it once but that’s it. Once it’s there, it stays there. And they are forced to read it.”

And the final say on the online forum from a teacher.

Excerpt 6:

**Teacher 3:** “It can be a fun thing, too. Learning can be fun, ‘cause those ones did learn, the ones who went on, they did put the time and effort in. They didn’t just use it like a text messaging device. They used it the right way. It’s just a shame more of them didn’t buy into it.”

### 3.6 Online Forum and Thinking

There was considerable evidence of Thinking. The thinking that occurred on the online forum varied in complexity. The questions posted were a mixture of closed and open questions. I had asked teachers to post open questions so that students had the opportunity to operate at the higher level of thinking. Questions such as, “Do we have a national identity?” gave the opportunity for opinions and different views to be expressed. The SOLO taxonomy could be used to develop questions of different complexity. I did not deliberately seek to do this but did notice some high level thinking in some of the posts. The SOLO levels could be identified from the online forum records. The following examples show how responses could be classified and identified.

In answer to questions posted by the Social Studies teacher, the range of SOLO levels was observed. Level 1 to 3 responses were given to the question, “Who were Lewis and Clark and what were they remembered for?”

#### **SOLO - Level 1**

“aren’t those people off superman???? Lol (Laugh out loud) ”

#### **SOLO – Level 2**

“were they the people that got sent by Thomas Jefferson to find the fabled river of the west in 1804?”

#### **SOLO – Level 3**

“Lewis and Clark were sent to explore the uncharted west during the four years that they would spend in the ‘corps of discovery’. They would travel thousands of miles exploring and experiencing lands and rivers and maybe people, never seen by Americans before.”

Level 4 and 5 responses were present in the answers to the question, “Who was William Colenso? What did he do that was significant to the Treaty?”

#### **SOLO – Level 4**

“well, i didnt read the whole thing, infact, i didnt read for more than a minute but the gist is that this guy was a printer sent from britainto nz, and he started publishing religious things, stuff from the bible and whatnot. the missionaries were in a bit of trouble before he came, but because of him, heaps of maori were converted. i think he also started the

first nz newspaper, the something gazette. he also published the treaty of waitangi somewhere along the line, giving alot of people their first chance to actually read it.”

### **SOLO – Level 5**

“when the maori were about to sign, william collenso asked; "do you think they really understand what they are signing?"

he was the only european to actually care to enquire as to the maoris knowledge of what they were actually doing. as it turns out, no one listened to him and now, everythings screwed up a bit. i recon they should just scrap the treaty of waitangi, and we should start fresh. its not something that brings us together, its only causing unrest and argument, and its being manipulated. its not only by the maori, but no offence, they are using it as a way to get hold of land and stuff. i guess it is a legally binding document, and they are right on a political level, and i wouldnt dream of being the expert on this topic... but is what they are doing - the whole sea bed and foreshore thing - a very good thing? i mean, sure, the treaty says all that stuff about it being theirs, but shouldnt we just move on as a nation instead of us all trying to steal land off one another? hakuna matata? lol.”

Using the SOLO taxonomy to gauge the level of thinking via the written response in the online forum has great potential. Responses can be considered and reasons why they are examples of high level thinking can be discussed with students. SOLO can be used as a valuable learning tool as well as an evaluative tool. One of the aims of introducing the Key Competency “Thinking” is to develop the type of thinking that will be required in the technological era that we are entering. Thinking that goes beyond a surface look at situations and that can span beyond the immediate context will be important for solving future problems that the world will face.

### **3.7 Conclusion - Online Forum**

My thoughts are that the online forum has tremendous potential to be used as a way to incorporate the Key Competencies into students’ learning, particularly in the areas of Participating and Contributing, and Thinking. Participating and Contributing can be more than going online and making comments it can include students being prepared to problem solve ways to make the online forum interesting and relevant to them. Different ways of thinking can be addressed in the question design; for example, one of the posts allowed creative thinking when a story was developed as students added to it. This could be a novel way of teaching plot design and character development in English. Researching skills can be developed as students go online to reference answers to questions and they post them in their own words. The issues teachers will face if they decide to use this activity will be ensuring that students do not see going online as being a chore and an enforced part of a course. To have value added to this activity there must be intrinsic motivation arising from interest in the activity. Keeping the interest and participation going in the online forum will be difficult and a challenge. Keeping the online forum up to date, fresh and relevant to the students are keys. This may mean participation by a number of the students’ core teachers to encourage them.

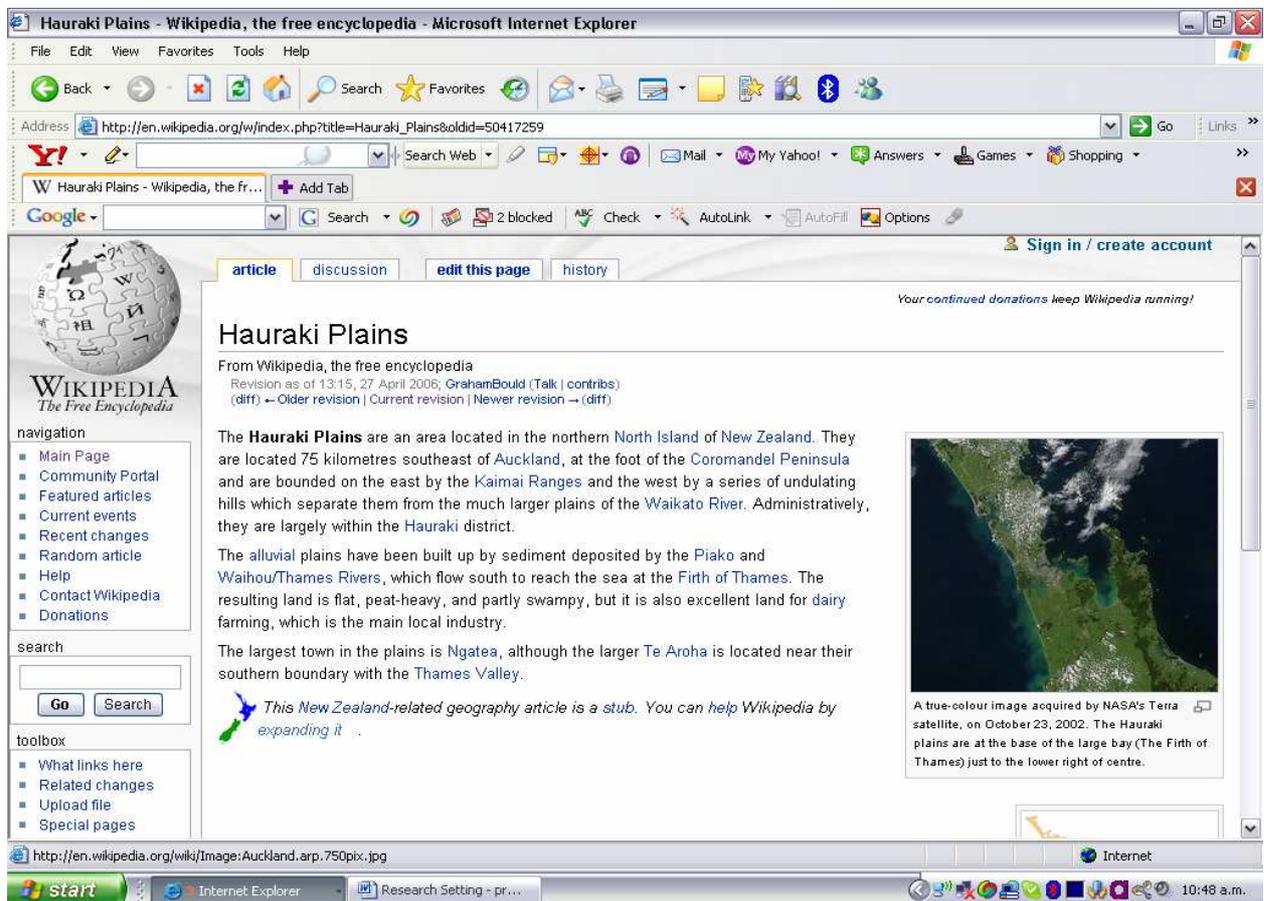
# CHAPTER 4: Case 2 – Wikipedia

## 4.1 Wikipedia – Background

Wikipedia is an online encyclopaedia that anyone can edit. It is also an online community that has a structure that allows volunteer administrators to exercise editorial control and delete unsuitable articles and block those who choose to vandalise articles. In the Honolulu Star – Bulletin (Monday, July 3, 2006. Section C2) the administrators are described as “mostly in their 20s, in constant communication, sharing the job of watching for vandalism”. Vandalism is described as a “dull roar in the background”. The accuracy of Wikipedia is also discussed; an article in the journal “Nature” concluded that the incidence of errors was only slightly higher than in Encyclopaedia Britannica, although disputed by them. Wikipedians are quoted as saying that, “in general the accuracy of an article grows organically” and “at first everything is edited mercilessly by idiots who do stupid things to it but as the article develops with citations accumulating, it becomes more accurate.”

This context appealed to me for a number of reasons. I was interested in the social nature of the Wikipedia site and the ability of students to access and edit it at will. I felt that the conventions and rules of Wikipedia required a teaching approach that was structured and well defined to allow students to understand how the site works and the various conventions associated with it. I also wanted to link the larger school Key Competency emphasis to the task. I chose the task as that of editing the local knowledge articles on the Hauraki Plains. The Hauraki Plains article was a “stub.” A stub is a small article that consists of a few sentences and perhaps a few photos. The article was small and had room to be extended. Part of the stub form of the Hauraki Plains Site, is shown below:

Figure 2: Hauraki Plains Wikipedia Article in the Form of a Stub



The potential to expand and build on local articles was an attraction to me. I also thought that the potential to have a worldwide, unlimited audience for the students could be a possible motivator.

The opportunity for students to collaborate and work together on facets of the task was a positive aspect and the fact that the topic did not rely on students needing a specific knowledge base was an advantage to me, teaching a Social Studies type topic. In effect, this resulted in a research project, which had limited the thinking to certain types. This demonstrates the need to consider carefully the tasks that will be taught and how they may result in particular types of thinking.

The structure of the unit and possible lesson outlines were developed and are shown in Appendix 1. I introduced Wikipedia with an investigation of a Wikipedia article based on the Treaty of Waitangi then have the students teach each other about the rules and conventions of Wikipedia. Following this, I prepared the students to consider the areas they could investigate, using Inspiration software to mind-map, and had the students choose areas of research. Students were then encouraged to put their information together with appropriate sources. After this, students were then given a task to present how to use code correctly, when adding information to Wikipedia. Teams would then edit the site and finally fill in a self evaluation based on the three Key Competencies I was concerned with observing.

I had negotiated with the core subject teachers to use one week of their teaching programme so that I could have a continuous four week block. I had booked the computer suite early in Term 1 and the actual project spanned from Week 4 to Week 7 of Term 2.



**ICT Room**

During the first period with the class I asked them to choose and get into teams of three. I asked the class to aim for a mix of genders and suggested that they form teams with abilities in different areas, such as a computer expert, a specialist in English and so on. This process happened in 3 to 5 minutes and there was no obvious dissent. I noticed that some teams had the same gender and similar ability. I selected two from the teams that were mixed gender and ability and placed them on one side of the computer room. Each of the two teams had a video camera positioned on them and analysis would be performed for each team.

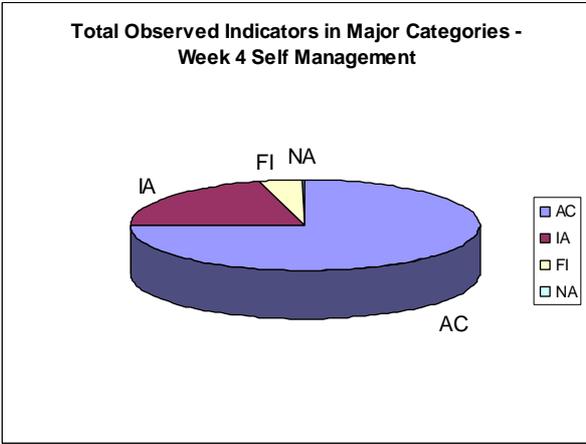
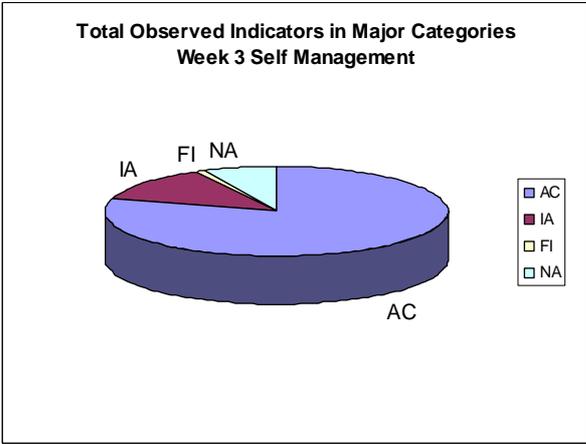
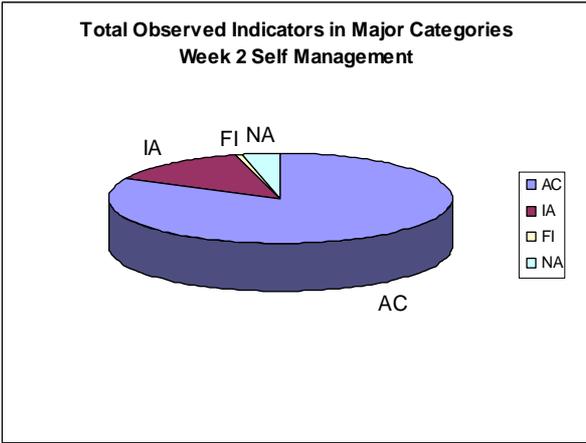
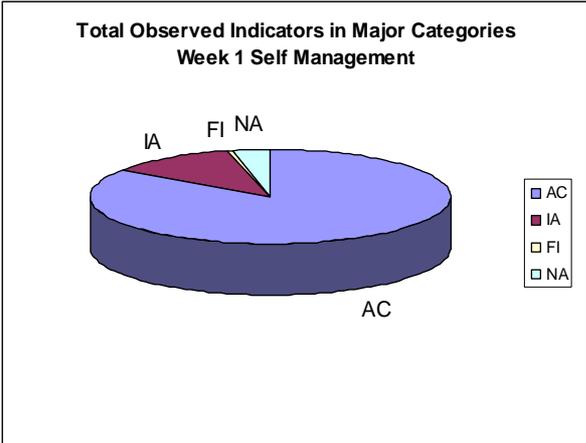
Three hours of video were analysed for each team, each week: one hour for each Key Competency. This resulted in approximately 24 hours of video analysis over the four week period. As with any teaching, there were interruptions to the teaching programme from unexpected sources. Not all students were present all of the time and this had the potential to change the dynamics of the team. Video was examined to identify and give a quantitative description of how the indicators were played out in the lessons and specific examples of evidence were recorded to validate the indicators.

## **4.2 Wikipedia and Self Management**

As for the online forum, I had decided to categorise the indicators for Self Management into three main areas, namely Action Indicators (AC), Internalised Attitudes (IA), and Future Indicators (FI). Off-task behaviour was classified as (NA).

The following graphs, Graph Selection 1, represent a comparison of the various Self Management indicators in major categories. It can be seen that the internal attitudes make up a smaller percentage of the total indicators observed; they are not displayed by students as frequently as the action indicators. One noticeable difference between weeks is the increased observation of the internalised attitudes in Week 4. This may be due to the editing process and self evaluation activities during this time. These activities seemed to actively engage and interest the students to a higher degree. Another difference is the increase in future indicators during Week 4; this can be explained by the self evaluation that was carried out during that week.

Graph Selection 1: Total Self Management Indicator Categories Observed for Weeks 1 – 4



**Action Indicators**

These indicators are those reasonably easy to measure because they are surface actions that occur in the classroom. Graph Selection 2 gives a quantitative summary on the Self Management indicators for Weeks 1 - 4.

All of the action indicators were identified in this time frame. The indicators Acting Appropriately (AC1), Following Instructions (AC4), Listening Appropriately (AC7) and Staying on Task (AC8) were the most frequently observed indicators. These are normally base line expectations for classes. Not acting appropriately (NA1) during the class was also observed; this included occurrences of talking while others were talking and various other off-task activities.



Table 6: Examples of Action Indicators for Self Management

<b>Indicator</b>	<b>Evidence</b>
<b>AC3</b>	All three in Team 3 get to class on time.
<b>AC9</b>	Team 3 begin to organise materials and computers ready for the task.
<b>AC10</b>	Student is given the folders to take up and takes responsibility for this task.

Some of these actions are limited to a small part of the period. The opportunity to get to class on time and show punctuality only occurs at the start of the period. Others may be task dependent, for example, a task can be set to give the opportunity for students to take responsibility.

The action indicators Completing Tasks and Homework (AC2), Completing Work in Class (AC5), and Having the Correct Gear (AC6) were observed infrequently. Examples of these indicators are shown in Table 7.

Table 7: Examples of Action Indicators for Self Management

<b>Indicator</b>	<b>Evidence</b>
<b>AC2</b>	Evidence not recorded.
<b>AC5</b>	Students work on the mind-map before they print it off.
<b>AC6</b>	Team organised and working together on the task - preparing for presentation.

These indicators were not as relevant as some of the other action indicators. Students were not set homework due to the nature of the unit and the option that I gave to the core subject teachers to allow students this time to continue with their core subject work.

Completing work in class was observed on the occasions that particular tasks were due to be presented or printed. Having the correct gear was not an indicator that was observed due to the fact that the computer gear was already available.

Graph Selection 1 shows that the action indicators were of similar percentages over the project's four week period. Off-task behaviour was observed in Week 1, when the students had begun the task based on a worksheet using the information from a Wikipedia site. Week 3 had more off-task behaviour than Weeks 1 and 2, this was during the time that teams were involved in researching and putting the results of their research together ready for editing. Off-task behaviour in Week 4 was negligible.

In interviews, the research part of the project was found to be "boring" by one or two of the students; other students found the research difficult. The great majority of the class were on-task and actively involved.

Figure 3: Thoughts on the Research Process

"I don't know. It was just kind of boring and we always got off task, really."

"Cause our topics were boring."

"It was hard to put the little bits of information to make one big topic. 'Cause there wasn't a lot of information about our topic; it was hard to find."

"The hard thing was probably researching the drains because everything was pretty much the same that we looked up about. Like, we went on one google thing and it was the same as the next one we would go onto, and half of them weren't even about the Hauraki Plains."

"I learnt how to research better and how to add stuff onto websites."

"I just wanted to get the research done and have a good result when it was put on Wikipedia."

The lack of information on the internet is an issue that would need to be taken into account during future Wikipedia based activities. Using local knowledge from members of the community is one way to increase the information that could be used. Allowing students to develop their own site in their own area of interest is a possible way to engage more students.

### **Internal Attitudes**

This category included the following indicators: Ability to Reflect (IA1), Resourceful (IA2), Resilient (IA3), Overcoming Hurdles (IA4), Interest in Learning (IA5), Working Independently (IA6) and Showing Initiative (IA7). Referring to Graph Selection 1 above, it can be seen that these indicators were not frequently displayed. By their nature they are not easy to measure. Having a video record is an advantage; however, these indicators were difficult to observe. These would be difficult to measure by observation in a busy classroom. It is not enough in my opinion to just look at a product and make a judgment on these indicators from that. They are very much intrinsic attitudes and values most probably better judged by the owner and co-workers. They are, in my opinion hugely important and are drivers of excellence. They are process oriented indicators that are demonstrated when difficulties and successes arise.

Table 8 below are examples of the type of evidence that represent these indicators.

Table 8: Examples of Internalised Attitude Indicators for Self Management

Indicator	Evidence
IA1	Teacher asks what sort of thinking this is. Female student responds, "Similarities of things"; male student talks about brain storming.
IA2	Student finds a problem with the search and asks for the teacher's help.
IA3	Student has overcome the problem of her team not being present today by starting onto the work.
IA4	Student puts up her hand to ask a question in order to overcome a hurdle.
IA5	Student puts up her hand and is eager to answer a question.
IA6	Student continues to work on the task independently while the girls have a social chat session.
IA7	Student, in consultation with her team, is the first to ask for a research topic.

### Future Indicators

The future based indicators included the following indicators - Setting Personal Goals (FI1), Making Plans (FI2) and Striving for Excellence (FI3). These indicators were minimally represented and difficult to measure. What does striving for excellence look like?

These indicators were also not prevalent as most of the planning for this activity was performed by me, the teacher. I had set the task and decided on the goals for each period. A more student centred approach including goal making and setting and revision of goals, would ensure that this aspect of Self Management was more prevalent.

From the self reflection sheets a range of comments were made on the planning involved. See Figure 4 below.

Figure 4: Students' Thoughts on Planning

"We didn't actually plan we just did the stuff as it came and we finished the work alright."

"We didn't really plan anything except for the PowerPoint things."

"We had to plan what we were going to use as our topic and how we would present our slideshows."

"I think I planned well for this activity."

"I think our team planned well for the Wikipedia project. We did well because we assigned different tasks to the people who enjoyed them."

Suggestions for planning also came from the structured interviews, as shown by the example below:

**Me.** "Were there any improvements that could have been made to help how your group worked together and what sort of things?"

**STUDENT 13:** "I reckon it would have been better if like every time we started we said oh this person will do that and that person is going to do that. So we knew what we were doing. Not just like, oh, I will just try and do that but that person might already be doing it. So, sometimes we didn't really get anywhere."

The potential for students to develop in this aspect of Self Management would be enhanced with more opportunities for planning incorporated into units of work.

Examples of evidence in this category of Self Management are shown in Table 9 below.

Table 9: Examples of Future Indicators for Self Management

Indicator	Evidence
<b>F11</b>	Teacher asks the team, "What are you going to do?" One student answers, "I might do my English work"
<b>F12</b>	Team 3 has some last minute discussion and makes changes to their presentation.
<b>F13</b>	Team 3 look carefully at their work just before they are due to present. Student is editing the presentation by adding sounds, very focussed.

This category could be developed and monitored by students operating a log book that is filled in at various stages during a unit of work or within a research process. On-going goal setting and monitoring could be incorporated into the classroom with regular evaluation and discussion on how teams or individuals are progressing. This may be a way for students to set goals and evaluate their own work.

Examples of excellence being presented to students would also give them the opportunity to see what excellence looks like and may encourage them to aim for it. Providing opportunities to improve mediocre work is also a way to “raise the bar” to get excellent work.

### **Self Management - The Potential**

Self management is not a matter of compliance. Compliance can be a result of teaching styles and approaches that focus on the actions of students in the classroom and around the school. Self Management is much more than this; it is using meta-cognitive processes to regulate and monitor actions, internalised attitudes and goal setting. There is clearly a place for teaching students how to manage themselves: to give them tactics so that they keep trying when difficulties arise, to teach students how to monitor their own work output and keep on with the task at hand and as a consequence for students to have an interest and enjoyment in learning.

Beyond this, perhaps, students should be setting their own learning goals, deciding what they should know at the end of a unit of work and how they will be assessed. On-going self assessment by the students to develop this Key Competency is important. Alton-Lee’s “Quality Teaching for Diverse Students in Schooling Best Evidence Synthesis” (Alton-Lee, 2003) states that one of the 10 aspects of effective teaching, the emphasis on “Self-regulated Learning”. Students are certainly the best ones to identify and report on their internalised attitudes, which are the driving indicators for Self Management.

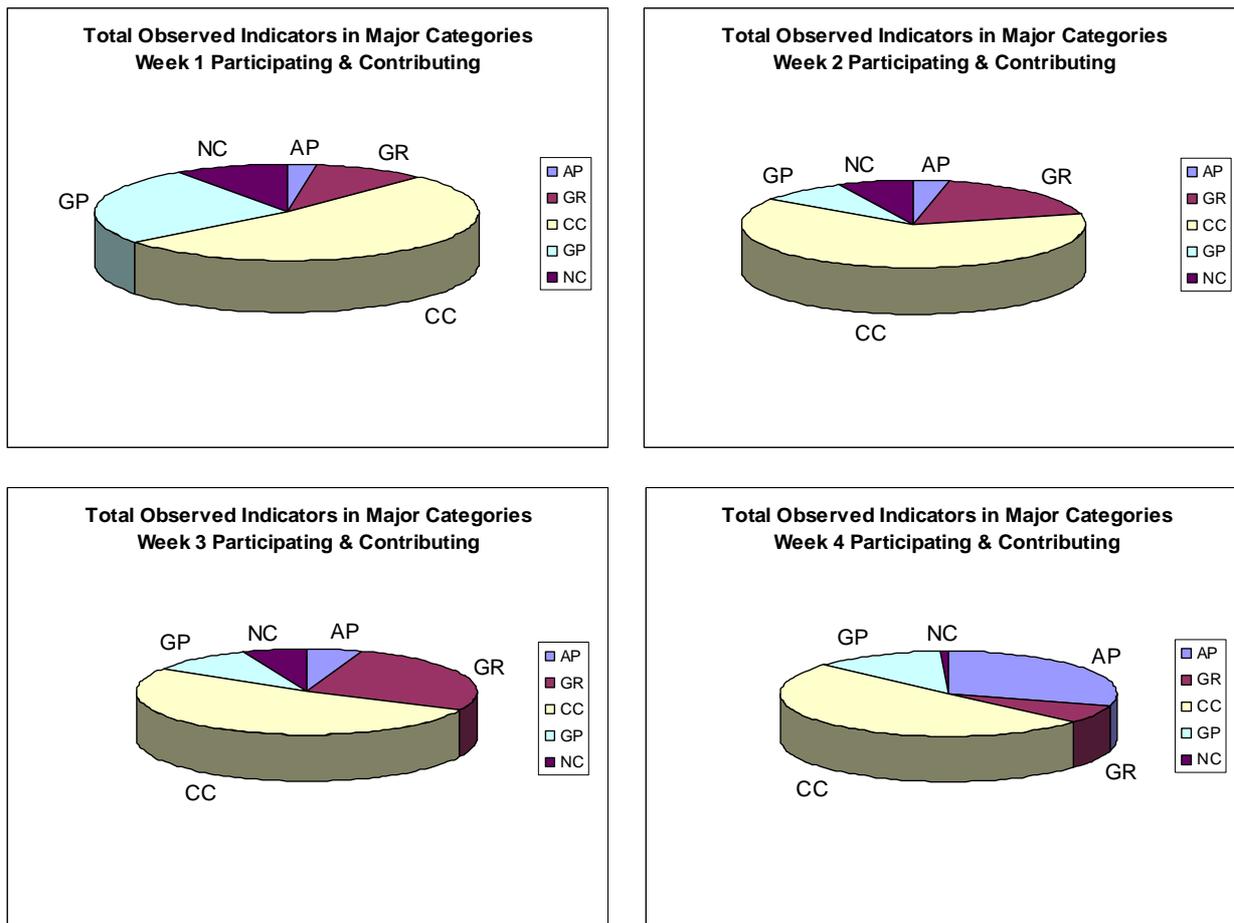
Self Management needs to be less about extrinsic pressures being forced onto students and more about tapping into their intrinsic motivations and dispositions to bring about values for learning and relating to others.

### **4.3 Wikipedia and Participating & Contributing**

The indicators for Participating and Contributing were divided into four main categories, based on classroom observations. These observations took place in the pre-trial period in Term 1. The four main categories include Active Participants (AP), Group Roles (GR), Classroom Contribution (CC) and Group Participation (GP). Non contribution was classified as (NC). The indicators chosen for this project are given in Appendix 2.

The novelty of editing the Wikipedia site and performing a self evaluation (using Kar2ouche software) was more evident during Week 4. The first three weeks consisted of activities and contexts more familiar to the students. During this time they completed PowerPoint presentations, researched and completed other activities with which they were more familiar. The following graphs, Graph Selection 3, compare major categories of indicators over the four week period. The increase in the Active Participant indicator over the four weeks can be seen, with it being at its peak level in Week 4.

### Graph Selection 3: Total Participating & Contributing Indicator Categories Observed for Weeks 1 - 4

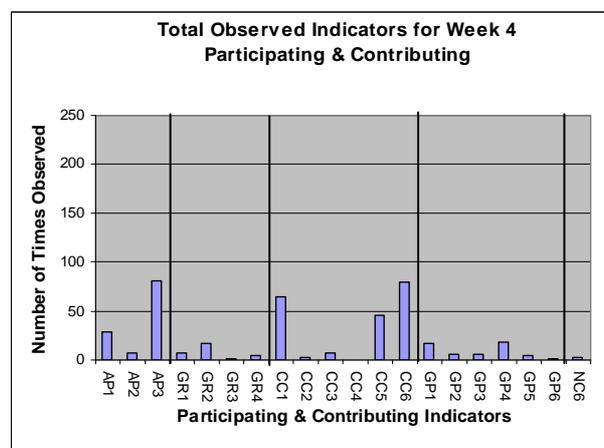
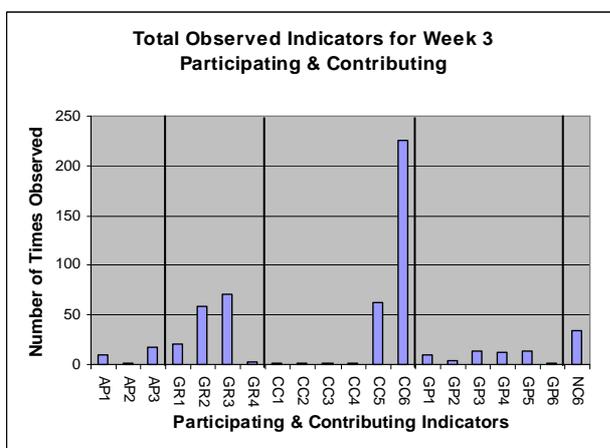
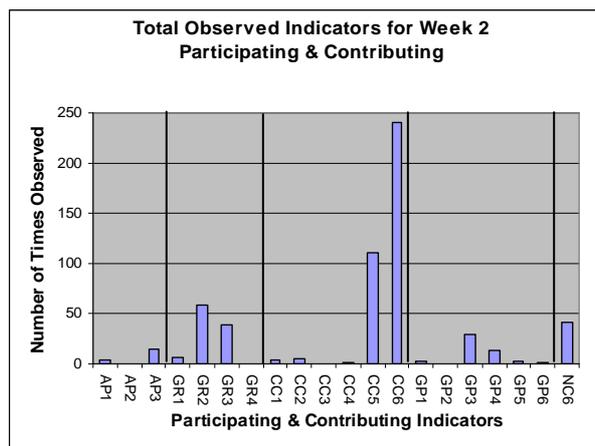
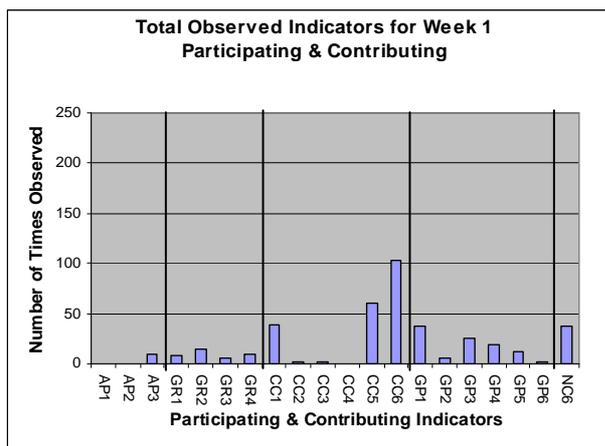


### Active Participants

This category was intended to show the ability of students to participate in new contexts and how they responded to the contexts. The indicators were Active Participants in New Contexts (AP1), taken directly from the Draft Curriculum statement on Key Competencies, Uncharted Lands and Novelty (AP2) and Engagement or Enjoyment of the Task (AP3). The idea here is that active participants are immersed and interested in the work.

Graph Selection 4 below shows the total indicators observed for the two teams during Weeks 1 – 4.

### Graph Selection 4: Total Participating & Contributing Indicators Observed for Weeks 1 – 4



The Active Participant indicators were more easily observed as engagement and enjoyment. It was more difficult to observe the first two indicators. Later in Week 4, during the editing process and self evaluation, all three indicators were present.

Examples of evidence for being active participants are shown below in Table 10.

Table 10: Examples of Active Participant Indicators for Participating & Contributing

Indicator	Evidence
<b>AP1</b>	Student is focussed on this self assessment task. Student is working well in this - new to her - context.
<b>AP2</b>	Student is asked to fix a storyboard by recreating it for herself and the rest of the class.
<b>AP3</b>	Student is still very much on task and engaged. Teacher asks about the enjoyment of the task in the last few days /10. One student gives a 10.

Observations in the classroom for this indicator are somewhat subjective. Engagement can be observed but whether it is due to the new context may be a tentative link. Some of these individual indicators could be collapsed into each other. It is more likely that AP2 and AP3 are a description of AP1. More detailed information about the participation due to the novelty of the task was gleaned from the structured interviews at the end of the unit. This suggests that a log book, for example, that included on-going questions on the context may be more revealing.

Some of the students in the two teams I observed were very active participants. They enjoyed the concept of the Wikipedia site, as the following excerpts show.

Excerpt 1.

**Me:** “Right, discoveries. Was there anything new and different, compared to what you already do at school, about this unit of work?”

**STUDENT 11:** “The whole thing was different. We never learnt to edit and create new pages on Wikipedia before.”

Excerpt 2.

**STUDENT 16:** “I had to learn how to do that editing thing. It was good 'cause I learnt how, 'cause you can kind of, some of that stuff relates to other stuff and how it says that it relates to other programming. Oh it's kind of like programming but those are like real simple techniques that they use.”

Excerpt 3. In answer to a question posed about the Wikipedia site:

**STUDENT 13:** “Like people submitting their own information. It's cool 'cause it's just like what people put on there, it's not just some one person who has created the site, it's like everybody can put whatever they want, well not whatever they want but, as long as it's normal, not rude stuff.”

## Group Roles

The idea of this category was to monitor the roles that the team members assumed. Roles were not assigned to individuals in this unit of work. It was observed that certain individuals acted as a team conscience, others took on the computer specialist role and yet others took more of a “back seat” role. I believe that for more active participation, roles would have been better assigned or negotiated by the team members. To see Key Competencies develop in students' lives they need to know their roles and how they could operate in them more effectively. There is the opportunity for discussion and teaching on the importance of working in a team with a given role. Video analysis showed clearly the team dynamics that were present. Perhaps there is a place for careful use of video analysis in the classroom. Role play activities could be recorded and then analysed by classes to examine the various roles that are present in a successfully operating team.

The following indicators were used: Balancing of Rights, Roles and Responsibilities (GR1), taken directly from the Draft Curriculum Document, Participation in Groups (GR2), Working as Part of a Group (GR3) and Learning from Others (GR4). Working as part of a group was taken as working on a task for the group and is different from

participating in a group. The indicators in this category could be developed to include more specific roles, such as leadership, encourager and other roles valuable to the smooth running of a team.

The roles for this task were not clearly defined and this resulted in some problems for the teams. The following interview excerpt illustrates this.

**Me:** “What were some of the difficulties you encountered in your group?”

**STUDENT 12:** “Um, people not doing stuff.”

Some suggestions to improve work effort were centred on team roles.

**STUDENT 13:** “Well, just like, 'cause we usually did the same thing. Like someone would research and someone would do the Word. And I would do the Word; they would just tell me what to write. We could have swapped around maybe.”

Classroom teachers also observed the different levels of participation from some individuals in teams.

**Me:** “What evidence of Participating and Contributing did you see?”

**Teacher 1:** “Oh, a lot. A lot, yeah, especially in that last activity where they all had to get involved. Um, whereas some obviously took on more of a role than others.”

It can be seen from Graph Selection 3 above, that this indicator category frequency was similar for the first three weeks. In Week 4, the frequency was significantly less. This can be explained by the individual self reflection that took place during this time. Students worked on their own computers and were no longer in teams for this part of the unit of work.

Evidence of each of these indicators is shown in Table 11 below.

Table 11: Examples of Group Role Indicators for Participating & Contributing

Indicator	Evidence
<p><b>GR1</b></p>	<p>Student redirects the team back onto the question, seems to be assuming a leadership role.</p> <p>Student assigns a task/question to fellow student who replies, "I don't know what it is." He responds, "Well, find out."</p>
<p><b>GR2</b></p>	<p>Team look at the piece of paper, reviewing the class's ideas.</p> <p>All members are working together, searching for information.</p>
<p><b>GR3</b></p>	<p>Team working together well and in a cohesive way; heads down, working.</p> <p>Each team member now seems to have a role and is working as part of the team, on different tasks.</p>
<p><b>GR4</b></p>	<p>Student points out some of the problems with the text that he is checking for another team.</p> <p>Student gives a tactic to other team members for finding out the main points.</p>

It seems to me that considerable thought needs to be given to allow students to develop in their ability to take on and improve in various roles within a group. This involves responsibility to the group to contribute in a positive way and the right to treat others fairly and with consideration. For a group to be effective, the activity that they are working on needs to be seen by the individuals as worthwhile.

It was seen that effort was dependent on the perceived value of the task. One of the team members in a closely observed team, was almost always on task and gave himself an 8 out of 10 for group contribution. The views of the student are made clear when asked about the Wikipedia activity.

Me: "Is there anything else you want to say about Wikipedia or the work on the computers?"

**STUDENT 16:** "Yeah, it was real fun because it was a big change from, usually you've got like the main subject and it's just writing, this you can get on the computer and find out new stuff and how to do new things."

### Classroom Contribution

This category of Participating & Contributing focussed on common classroom activities. It included: Answering Questions in Class (CC1), Contributing to Classroom Discussion (CC2), Filling in Answers on the Board/Computer (CC3), Bringing Ideas from Home, Culture, etc (CC4), Taking Part in the Class (CC5), Being On-Task (CC6) and being Off-Task (NC6).

The observation of these indicators is reasonably easy as it is the interface that is seen by the teacher as the observer. The video analysis caught some of the off-task behaviour, such as eating, flicking onto other files, such as school sports photos and so on.

Although these indicators are easily observed, their potential to be used to develop the Key Competency of Participating and Contributing is of limited value. These would be some of the basic expectations in a classroom. For some classes, however, they may be an initial first step and a required focus.

Evidence of these indicators is given Table 12 below.

Table 12: Examples of Classroom Contribution Indicators for Participating & Contributing

Indicator	Evidence
<b>CC1</b>	Teacher asks, "How is it going?" Student answers, "I found this whole thing about school. (In Turua)"  Two students put their hands up in response to the question, "Who has used Inspiration software before?"
<b>CC2</b>	Student responds to the teacher's question about who has a digital camera. "Can I bring my phone camera?"
<b>CC3</b>	Teacher asks what they found out about Wikipedia. Answer given by student who is asked to type it up on the laptop at the front of the class.
<b>CC4</b>	Student asks, "Do we have to bring the cord of the camera?" Student brought camera from home.
<b>CC5</b>	Team 3 are focussed on the task.  Students in Team 7 listen when teacher talks.
<b>CC6</b>	Students listen initially as teacher gives overview of the period. (On-task)  Student seems to be working on other things and is not very focussed on the task. (NC6)

Some of these indicators were infrequently observed. CC4, was incorporated into the indicators as it had appeared in the pre-trial observations. In a Social Studies lesson, a student had related their own personal experiences about moving from South Africa to New Zealand. It did not present itself strongly in this context, as shown by Graph Selection 4. Different units of work may allow for a variety of indicators to be observed, other than those which I have chosen.

Another indicator that was not frequently observed was CC2, contribution to classroom discussion. This was simply due to the structure of the lessons as there was only a short time at the start of the period where the class was asked a few questions and then continued with set tasks.

The task creation should take into account the aspects of the Key Competencies that the teacher desires or deems necessary to see developed in the students.

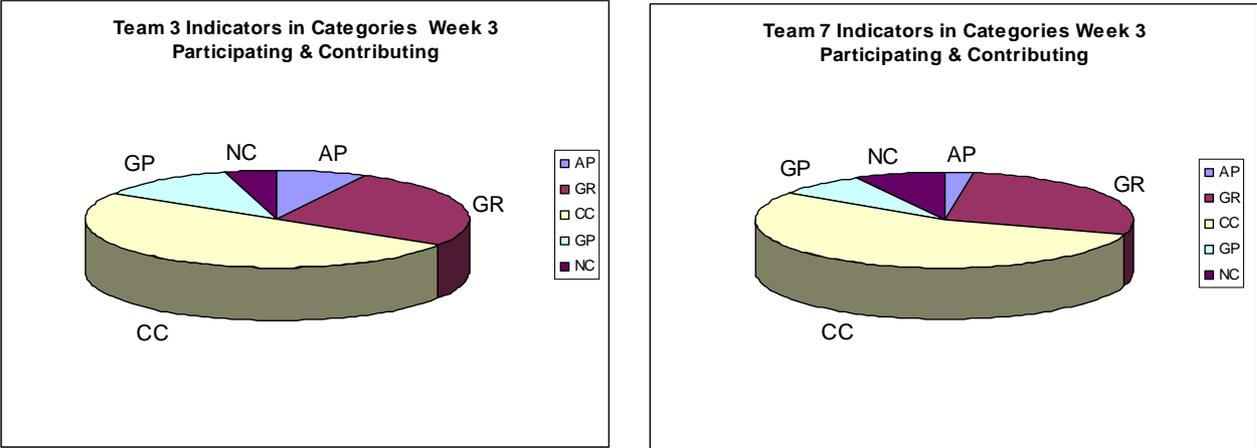
**Group Participation**

This category includes some of the processes that are used when groups are working together. I have included Collaboration (GP1), Helping Others (GP2), Discussion (GP3), Teacher and Students Co-solving (GP4), Listening (GP5) and Sharing Own Experience (GP6).

These indicators examine how a group operates and are distinct from the roles that members of a group assume or are given. This category focuses on the participation and contribution that occurs as the group works together. The teacher is included, as often they assume a facilitating role. These indicators also point to the interactions and relationships within a group. Referring to Graph Selection 3 above, Group Participation was similar for Weeks 1 - 4. This topic was designed primarily as a collaborative based unit of work.

Comparison between teams revealed that Team 3 had a higher percentage of the Group Participation indicators; as can be seen in the following Graph Selection 5 below.

Graph Selection 5: Participating & Contributing Indicators Team Comparisons for Week 3



It can be seen that group participation is more prevalent for Team 3. I had set goals and activities that were due each period. For example, teams needed to work together to produce PowerPoint presentations and then present them to their peers. Team 3 worked more cohesively as a team during Week 3, the research phase, and their motivation was higher.

Evidence for this category of indicators is given in Table 13 below.

Table 13: Examples of Group Participation Indicators for Participating & Contributing

Indicator	Evidence
<b>GP1</b>	Student reads out a question and gets the team working together.
<b>GP2</b>	Student helps a different team, by proof reading the work they have produced.
<b>GP3</b>	Students discuss the task as they search for information.
<b>GP4</b>	<p>Student says, "I don't get it." Teacher (Me) joins the team and makes some suggestions.</p> <p>Student has not logged on yet, as they cannot log off a current user. Teacher helps with this.</p>
<b>GP5</b>	Team members are talking to each other and attentively listening.
<b>GP6</b>	<p>Student shares where she is up to in her evaluations with a team nearby.</p> <p>Teacher asks, "What do you think of Wikipedia?" Student answers, "It's got everything in it; I looked up Sega."</p>

The idea of working in teams was seen in a positive light by all of the students interviewed at the end of the unit of work. The following excerpts outline the advantages that students find with this approach to their school work.

Excerpt 1.

**Me:** "What did you think about working in groups for this activity?"

**STUDENT 11:** "Yeah, you learn with people. You learn a lot more, what the people are like, their patience and their work effort."

Excerpt 2.

**Me:** "What do you enjoy about group work?"

**STUDENT 12:** "It's easier 'cause there's three and it gets done quicker."

**Me:** "Anything else you enjoy about working in a group?"

**STUDENT 12:** "It's more interesting and it's not so boring."

**Me:** "Okay, what do you enjoy about working in a group?"

**STUDENT 13:** "Yeah, it gets done quicker and 'cause you've all got different like attributes you could bring, you know. And it was cool 'cause I had Student 14 in there and Student 16, like brainy."

Excerpt 3.

**Me:** “What did you think about working in groups for this activity? What did you enjoy about working in a group?”

**STUDENT 14:** “I liked working in groups because I like to work with other people. I like to work by myself but not as much and yeah, you just have someone to talk to, kind of thing and discuss.”

The enjoyment these students had working in teams was pleasing to see. This is a skill that will be required by these individuals as they move into their pathways towards further education and employment. This aspect of Participating and Contributing is a Key Competency that could easily be developed with tasks that foster team participation and capture students' imagination. The Wikipedia task did that for some of the students.

### **Participating & Contributing – The potential**

The indicators and boundaries for this Key Competency that I choose were based on classroom observations. The potential exists for this Key Competency to be developed in more creative ways. Students could participate with experts outside of the school to gain insight into real learning contexts, for example, linking up with scientists to help with a research project for a Science fair. Students could gather opinions from outside of the local area where they live to understand different view points and cultures. Online forums could be used as a different context to encourage participation and contribution.

Some students tend to be very active outside of school and participate in activities they are committed to. How do we tap into the intrinsic motivation the students have for these? Perhaps it is not just a matter of tapping into the motivation but giving the students the skills to apply this motivation to other 'less interesting' things they do. If motivation is only present for exciting activities, then is this a realistic approach to the realities of life? A more realistic approach is for students to value the learning process and be motivated by the challenge that this provides them. This will mean the classroom teacher need to actively involved in promoting this as a challenge in the classroom, giving students the benefits of being a lifelong and life-wise learner.

School-wide participation can be much more than compliance, it can be taking on leadership roles around the school, helping others and being a contributing citizen. A school-wide emphasis might see students going into the community and, for example, helping older people, as part of a community project.

The ideal is for students to want to give back to society, school and each other by Participating and Contributing, for them to value this and, beyond that, for it to be a part of their character.

The Hauraki Plains College Charter has the word character around its outside. Character is the demonstration of the competency that is intrinsically valued. We want our students to be people of character, who value participating in sports teams debating teams, the classroom or wherever, because they know that it is part of who they are and that they are valuable and appreciated individuals.

## 4.4 Wikipedia and Thinking

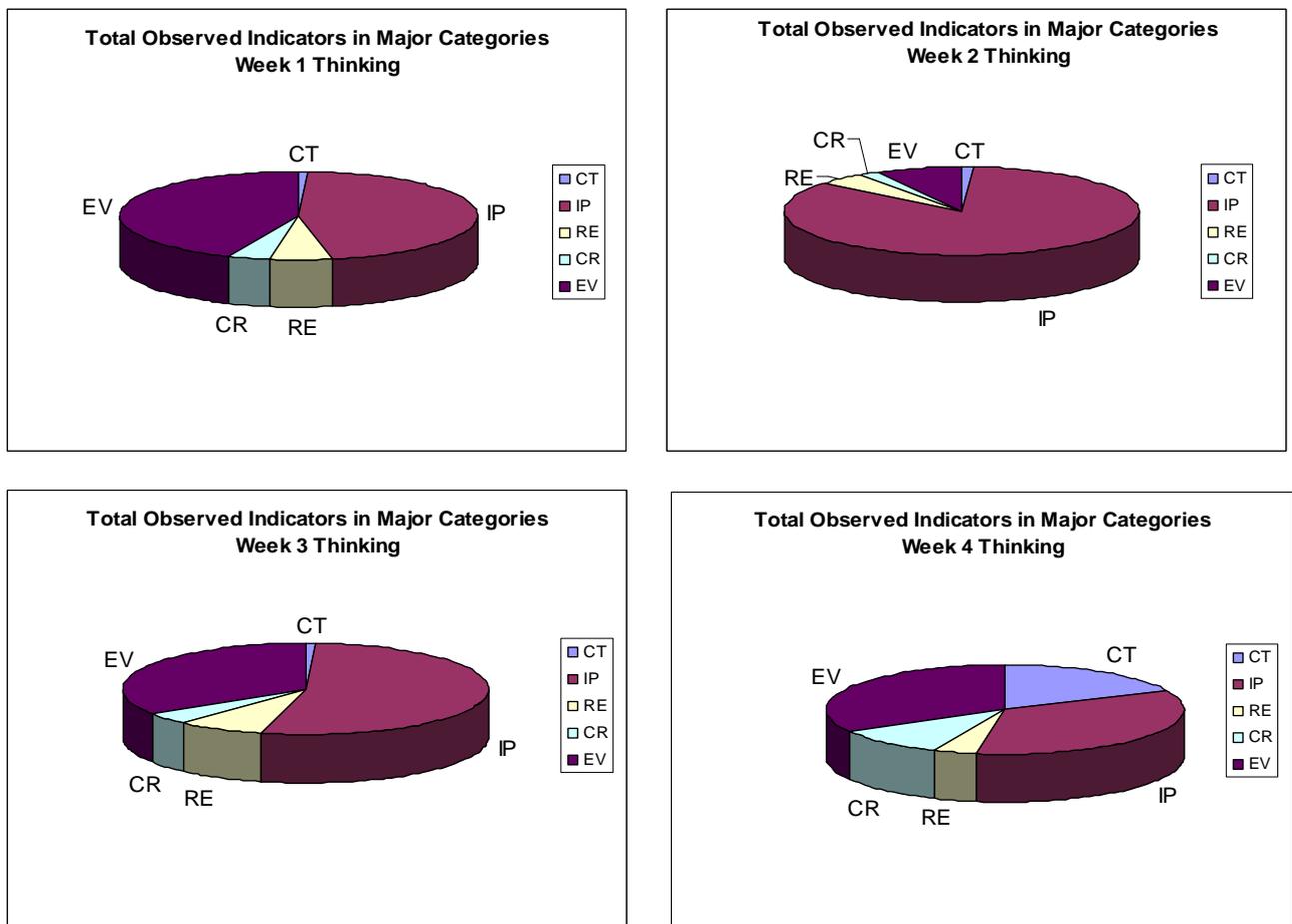
Thinking was looked at in two ways. Firstly, it was categorised into five main types of thinking using indicators from the Draft Curriculum statement on Key Competencies. This list of indicators was extended by observations during the pre-trial period in Term 1 and the indicators for creativity came from the NZCER. The main categories include Critical Thinking (CT), Information Processing (IP), Reasoning (RE), Creativity (CR) and Evaluation (EV). Secondly, thinking was looked at using the SOLO taxonomy to categorise thinking into levels of complexity.

### Critical Thinking

This type of thinking was demonstrated in some instances in this activity. It was not a major emphasis in the development of the unit of work and as such did not come through strongly in the students' approaches to their work. The category includes the indicators for reflective thinking of their own abilities and attitudes and the process that they used. The indicators chosen were Critical Thinking (CT1) and Reflective Thinking concerning themselves, or reflection on the method (CT2).

The following graphs, Graph Selection 6, show that the majority of the critical thinking that was observed occurred in Week 4. This will be due to the self reflection activity that was part of the unit of work, which students completed in the last two periods of the four weeks.

Graph Selection 6: Total Thinking Indicators Observed for Weeks 1 - 4



Evidence of the critical thinking that was observed is shown below in Table 14.

Table 14: Examples of Critical Thinking Indicators for Thinking

Indicator	Evidence
<b>CT1</b>	Students have been checking the correctness of the material and have been asked to critically read it. Student comments to another student's statement about her being organised. ("Are you seriously going to write that?")
<b>CT2</b>	Reflection on the work that a student has added to the presentation as he continually evaluates it. Student begins to evaluate her input into the team.

The degree of critical thinking that was displayed by students seemed to depend on the task which they were given. In this Wikipedia task, critical thinking was more of a focus when the students were evaluating their contribution to the work during the self evaluation phase of the activity. Critical thinking was also present during the structured interviews as they actively reflected on the activity. The following interview excerpts demonstrate the critical thinking that students engaged in during this process. Making room for interviews as a part of classroom practice has the potential to develop this type of thinking. The practicalities of this would need to be considered.

These students did not like being given the general topic, even though they could choose within that topic the area that they would research.

Excerpt 1

**Me:** "What was the reason that you didn't enjoy the researching?"

**STUDENT 15:** "I don't know. It was just kind of boring and we always got off task, really."

**STUDENT 14:** "'Cause our topics were boring."

**STUDENT 15:** "If it was on something else, maybe."

**STUDENT 14:** "I didn't care about the topic."

**Me:** "About the local area?"

**STUDENT 14:** "I care about the area, you know, but I don't care about researching it."

Some interesting self reflection also surfaced during the interview process.

Excerpt 2.

**Me:** "Is there anything you think you needed to improve on?"

**STUDENT 11:** "Yeah, I think my research was. I would type in something and get lots of information but I would only stick to that certain website, not go to different ones and maybe get other information."

Excerpt 3.

**Me:** “Was there anything you felt you yourself could have done better?”

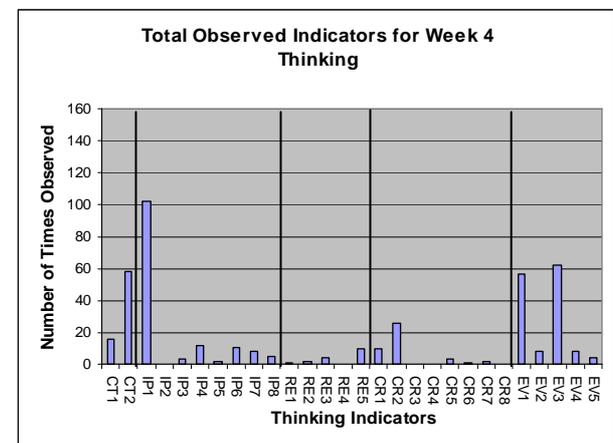
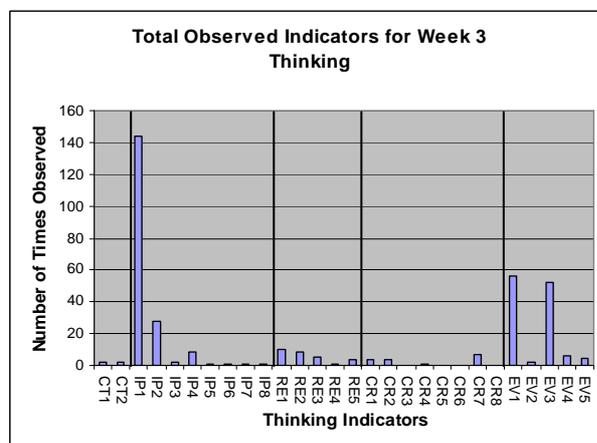
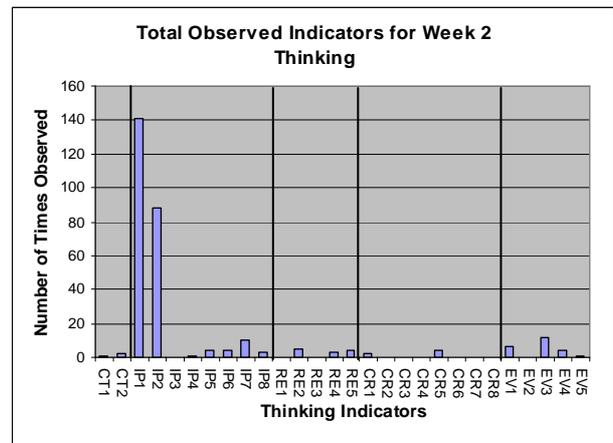
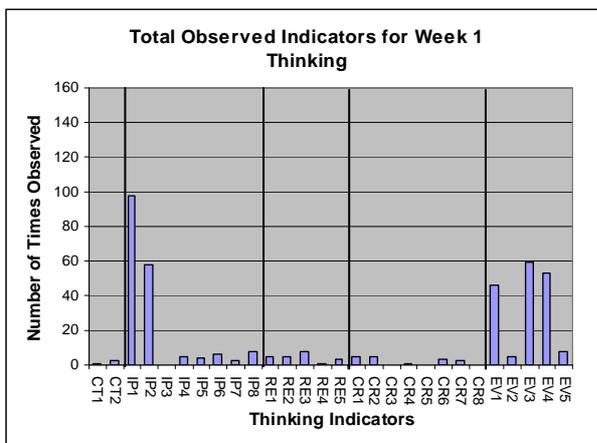
**STUDENT 15:** “Yeah, I probably could have done a bit more than what I did.”

### Information Processing

From Graph Selection 6, it can be seen that the Information Processing category of Thinking was observed frequently. This category included the following indicators: Information Processing (IP1), Researching (IP2), Providing Evidence (IP3), Organising (IP4), Enquiry Skills (IP5), Seeking Clarification (IP6), Experimenting (IP7) and Questioning (IP8). This type of thinking is the searching, manipulating, absorbing and recording of information. It was observed frequently as the activity was based on these types of tasks. Researching was a major component of the Wikipedia activity. The class moved from little knowledge of the site to a working knowledge of the site and some understanding of the conventions associated with the site.

Graph Selection 7, shown below, gives the individual indicators for this category over the four week period. Most Information Processing indicators had been observed, with IP1 and IP2 the most frequently observed.

Graph Selection 7: Total Thinking Indicators Observed for Weeks 1 – 4



Evidence of the Information Processing indicators is shown below in table 15.

Table 15: Examples of Information Processing Indicators for Thinking

<b>Indicator</b>	<b>Evidence</b>
<b>IP1</b>	Student has turned on the computer and has Wikipedia up. Both her and a fellow team member are looking at the relevant Wikipedia site.
<b>IP2</b>	Two students work together and are extracting information from the Wikipedia site for their PowerPoint
<b>IP3</b>	Students leave the classroom to take a photo for their project.
<b>IP4</b>	Student saves the team's work on the computer.
<b>IP5</b>	Student asks the teacher, "How do you change the background of one slide?"
<b>IP6</b>	Students seek help with the search of their topic. Teacher gives some suggestions
<b>IP7</b>	Student is using different types of techniques - screen shot and moving line to circle a point, as part of the presentation.  Student is prepared to experiment with colours and the slides as she views them.
<b>IP8</b>	Student asks for help with adding a speech bubble to her storyboard evaluation.

Critical thinking can be developed by incorporating the opportunity for it to be used in an activity and giving space for self evaluation whether in the form of interviews or other evaluation techniques.

## **Reasoning**

This type of thinking was observed on some occasions, as seen from Graph Selection 7, and the indicators consisted of Reasoning (RE1), Describing (RE2), Explaining (RE3), Giving Reasons (RE4) and Making Informed Judgments / Decisions (RE5). The indicator RE4 could be subsumed into RE1 as they were fairly similar, the difference is subtle. Giving a reason can be in defence of a point of view whereas reasoning maybe about a task.

This category of thinking was minimal due to the nature of the task. Some reasoning exists in most activities but it could be incorporated as a focus in a more fitting context.

Examples of evidence for this type of thinking are shown below in Table 16.

Table 16: Examples of Reasoning Indicators for Thinking

Indicator	Evidence
RE1	Two students discuss information about copyright that they find on the site.  Teacher discusses the need for an interview on this unit of work. Student is not impressed with it being at lunchtime.
RE2	Student gives an answer describing an aspect of the lesson covered yesterday. "Reliable resources"
RE3	Student explains to another student how to get the picture up on the storyboard of the Kar2ouche program.
RE4	"Have you finished your PowerPoint?" - teacher asks. "I was waiting for the girls to come back," is the reply.
RE5	Two students are making judgments about what to include and exclude on the Wikipedia site.

**Creative Thinking**

Looking at Graph Selections 6 and 7, we find that this was a minimally expressed type of thinking. It is not easy to observe and perhaps is most easily seen in the product rather than the process. Opportunities for creativity came about during the making of the PowerPoint presentations and using the Inspiration mind-mapping software. To facilitate creativity, a more open task and brief would be required.

Interestingly, many students in their self evaluations thought that creativity was the most important type of thinking. Below, in Figure 5, is a quote from a self evaluation storyboard. The photograph of the student has been replaced.

Figure 5: Importance of Creativity



Students seem to genuinely enjoy being creative and I observed this myself as they gave their presentations and created mind-maps using the Inspiration software. Having many options to choose from within a given structure seems to allow for creativity and ICT has an advantage in this respect. Students experimented with colour, motion, sound and format when given the opportunity to do so.

Table 17 below gives examples of the evidence that was collected for the Creativity category of Thinking.

Table 17: Examples of Creativity Indicators for Thinking

Indicator	Evidence
<b>CR1</b>	Both team members generate their own ideas on how the activity went. Also, they place the speech boxes where they wish to on the storyboard evaluation.
<b>CR2</b>	Student decides what to add and the links to make as they edit and place their information on the Wikipedia site.
<b>CR3</b>	Not Observed
<b>CR4</b>	Student tries different motion attributes with his PowerPoint slide presentation.
<b>CR5</b>	Teacher asks how the title by itself could be fixed. Student comes up with a solution. "We could like write a summary under the heading."
<b>CR6</b>	Student talks to another team and asks "Why do we need to plan anything outside of school?"
<b>CR7</b>	Student has edited and changed the headings to suit the overall look and correctness of the Wikipedia site.
<b>CR8</b>	Not Observed

The indicators for Hypothesising (CR3) and Is Not Afraid to be Different or Wrong (CR8) were not observed during the activity. This does not necessarily mean that they were not occurring on a sub-conscious level as the students were working or relating together during the various tasks.

Some of the work the teams produced was of a high standard and showed creativity. See Figure 6 below.

Figure 6: Creative PowerPoint Example

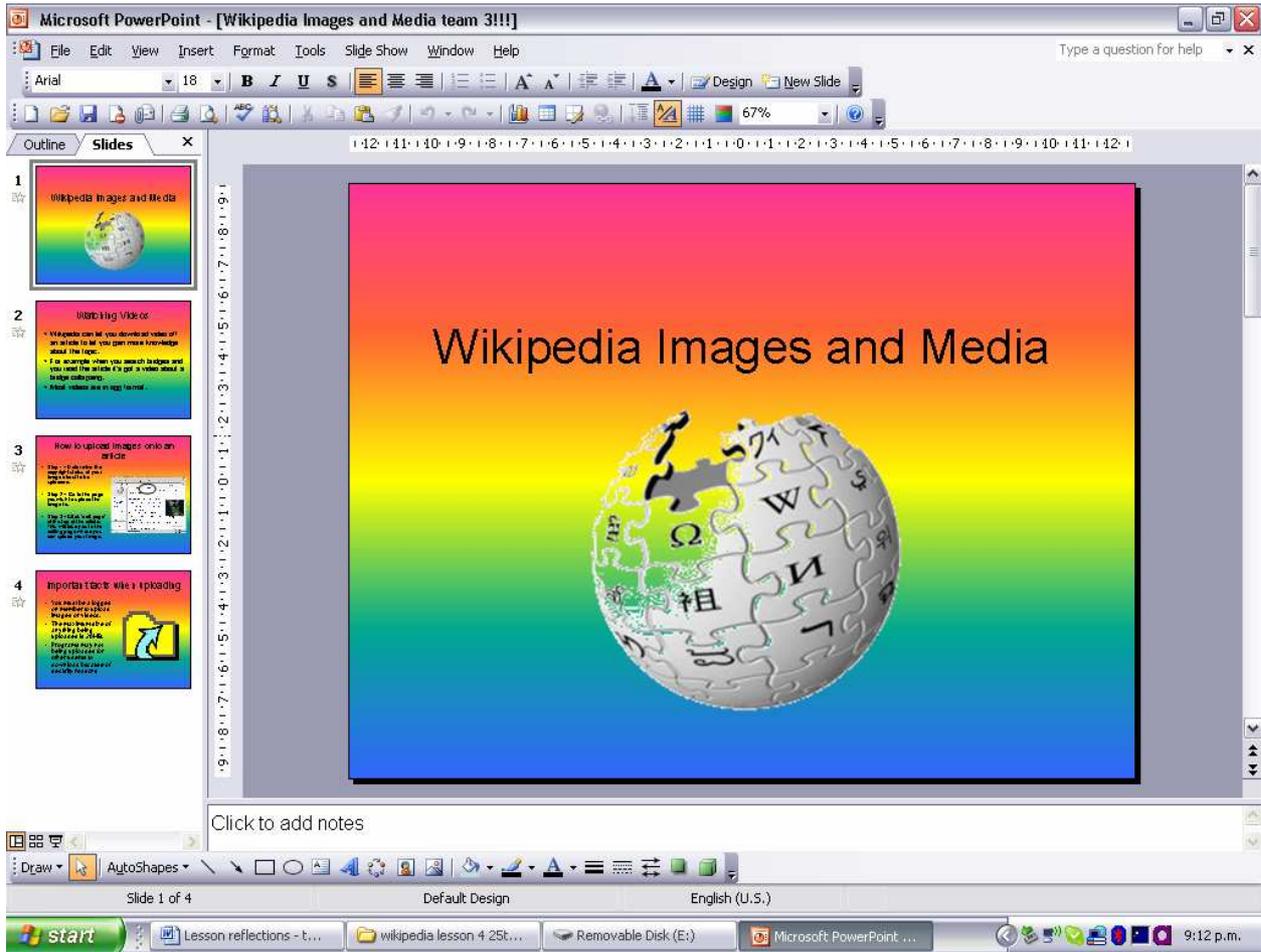


Figure 7: The Piako River

This well balanced photo, Figure 7, was taken by one of the teams and was added to the “Piako River” site on Wikipedia.

I believe that creativity is a way to engage students and that it is an exciting opportunity to hook students into learning and the enjoyment of learning.



## Evaluating

The last category of Thinking was Evaluation. Graph Selection 6 shows that it was well represented during each of the four weeks and that it was second to the Information Processing category. During Week 2, Evaluating was not observed as frequently, due to the research nature of the task that week.

The indicators used were Evaluating Product (EV1), Correcting (EV2), Editing (EV3), Changing (EV4), Revision and Changing (EV5). A smaller number of categories could have been chosen with some of these indicators collapsing into each other. Evidence for Evaluating is shown below in Table 18.

Table 18: Examples of Evaluating Indicators for Thinking

Indicator	Evidence
<b>EV1</b>	<p>Student plays the slides that he has created and reviews them.</p> <p>Student evaluates the topic, "Why have we chosen such a boring topic?"</p>
<b>EV2</b>	<p>Both students laugh at a slide on their PowerPoint, "I will change it," says one of them.</p> <p>The team is proofreading and correcting the material as they go.</p>
<b>EV3</b>	<p>Student has pulled up the team's PowerPoint slides and is editing them.</p> <p>Student enters information into the word template.</p>
<b>EV4</b>	<p>Student says, "I think you should move it and put it over by the green bit."</p> <p>Student is changing the Wikipedia site.</p>
<b>EV5</b>	<p>Student is continually changing and revising his PowerPoint slide with the team's help.</p> <p>Student says to the team, "It's too big (the search). Try another search."</p>

Some combining of EV3, EV4 and EV5 could be justified due to their similar nature. This activity required evaluation over the four weeks. The teams evaluated their work on PowerPoint, Inspiration and throughout the research phase of the project. They were also required to evaluate the material they would add to the Wikipedia site. Some students were also asked to evaluate the topic in the structured interviews.

**Me:** "First of all, what were some of the good aspects of the Wikipedia activity?"

**STUDENT 16:** "It was cool how we found out how to edit it and stuff and how anyone can just access it and change it around."

**STUDENT 11:** "It was better than normal 'cause we did no writing, where everything was just using a computer. And we learnt quite a lot of how to do things."

Building evaluation into an activity will also enable the teacher to monitor how the students feel about the work they are doing. Evaluation along the way enables students and teachers to take stock, to change programmes of work, if necessary. It is a tool that can be used to aim for excellence.

Evaluation is a key to getting the best work from students. The students monitored were very good at evaluating their work and worked on making changes, especially if they were to present in front of the class.

### **SOLO Taxonomy and Thinking**

The SOLO taxonomy, as discussed above, was also used to categorise thinking. This is not the conventional use of the SOLO taxonomy; it is most commonly used to classify a written product. However, to give a general qualitative indication, samples of thinking in each week were recorded as evidence and given a SOLO level from 1 - 5. This is a not a quantitative investigation of the thinking but an indication of the thinking that occurred each week.

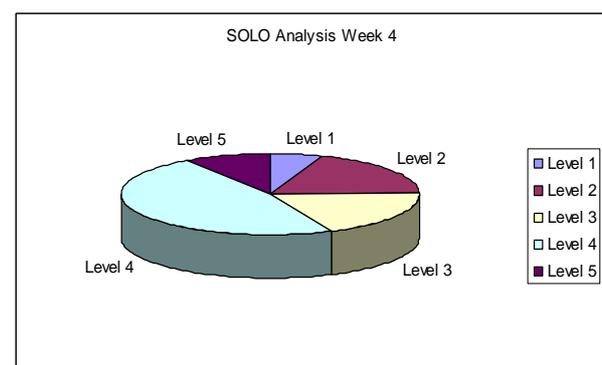
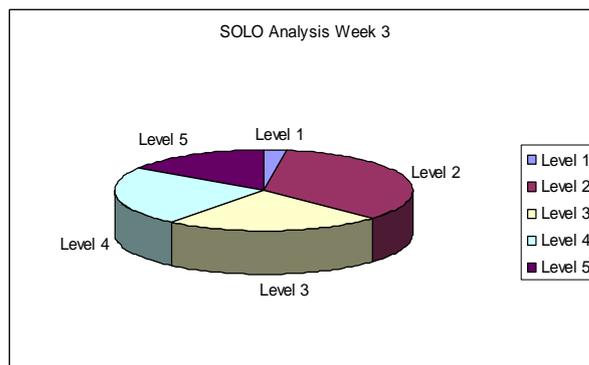
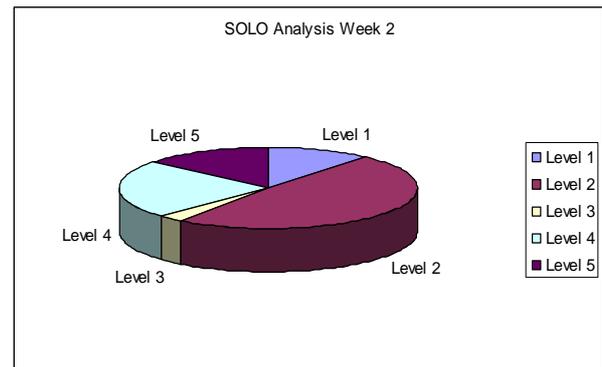
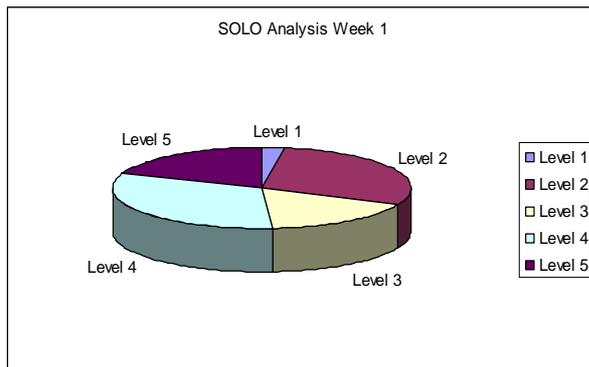
An example of the coding using SOLO is shown in Table 19 below.

Table 19: Examples of Coding Using the SOLO Taxonomy

<b>SOLO Level</b>	<b>Example</b>
<b>1</b>	Student gives a weak reason for the team not being on the site or on task when asked by the teacher.
<b>2</b>	Student is still looking at and searching Wikipedia, researching, looking for information for the slide show.
<b>3</b>	Student using the Wikipedia site begins explaining to a fellow student what a template is.
<b>4</b>	Team start to work on aesthetic qualities of the PowerPoint presentation, e. g. sound. Putting the presentation together.
<b>5</b>	Student continues to edit Wikipedia, and find out how to edit it, ahead of other class members and the teacher's timetable for this.

Graph Selection 8, which follows, gives a sample analysis of the thinking that has occurred for each week.

## Graph Selection 8: SOLO Analysis of Thinking for Weeks 1 – 4



Level Five thinking remained similar throughout the Wikipedia activity. The self evaluation part of the course occurred during the last week and this may explain the increased Level Four thinking that was observed during this time.

Level One is an indication of not understanding a task or not bothering to engage in it. This type of response was not observed frequently and, from my general observations, the class were operating beyond this level most of the time.

This was a general look at SOLO over the two teams I observed. An individual student's level would vary from task to task and could be more easily identified from more standard written tasks.

An advantage with using the SOLO taxonomy is that it can be taught to students to develop their thinking. SOLO can be introduced as a tool, with examples given from a range of contexts. Some schools are including SOLO with a school-wide emphasis, along with other thinking approaches.

Another way to consider using SOLO is to work out how to incorporate SOLO levels into tasks and activities. SOLO can be factored into questions and the levels incorporated to allow higher levels of thinking to be expressed.

Just how SOLO may be used in the development of a unit of work is a matter for discussion and trial. It may be that incorporating the different types of thinking, especially higher order thinking is a starting point. SOLO as a structure to teach students and as a tool to assess has merit. The exercise and development of higher order thinking is how the Thinking Key Competency can be presented to students. Then the students can be taken from their current levels of thinking to more developed levels.

Perhaps a profile of students can be constructed from a range of activities using SOLO as a base.

### **Thinking – The potential**

Wikipedia tasks have the potential to develop students' thinking when structured well. Different types of thinking can be developed and made a focus in the design of units of work. A more open task may allow creative thinking to surface. The research process can develop information processing skills. Making a product and presenting it in front of peers can be used to develop evaluation as a type of thinking. Self assessment and critical analysis of tasks may be used to enhance critical thinking. Reasoning skills could be made more of a focus. Alongside the different types of thinking that could be cultivated, sits the SOLO taxonomy. This has the potential to be used as a tool or structure to develop thinking processes in students. SOLO can be introduced to students along with other thinking tools in their units of work to develop higher order thinking. SOLO could also be used to gauge where the students' thinking is at for different tasks.

### **4.5 Conclusion – Wikipedia**

Wikipedia can be used much more creatively than just as a source of information. It can be used as a collaborative tool in the classroom when students are encouraged to find out about its various conventions and then add to and edit articles. Most students were highly motivated by producing an article that could be accessed by anyone in the world. One student related the task to our school charter, recognising that they were indeed leaving a legacy for future students, who could add to the Hauraki Plains article. Wikipedia has the potential to be used in a variety of subject areas. The Key Competencies were observed in different degrees in this task. The task could have been developed differently to emphasise certain types of thinking or more in-depth planning and goal setting. It will be important to plan and develop units of work with outcomes in mind. The Wikipedia task has the potential to be used to develop a number of the Key Competencies and, at the same time, provide a task that will motivate and interest students.

## CHAPTER 5: CONCLUSION

New Zealand schools have adopted a number of tools to develop thinking. Some of these tools have been implemented school-wide, while in some schools individual teachers use the tools as they see the need arise. These tools include: Edward de Bono's "Six Thinking Hats", which is used to give students an insight into different perspectives on an issue, Howard Gardiner's "Learning Styles", which takes into account a broader range of human potential in children and adults, "The Three Storey Intellect" which uses the Bloom's Taxonomy as a base to develop critical thinking, and Art Costa's "Habits of the Mind", which aids in the use of multiple thinking strategies and dispositions. We can add to this list the SOLO Taxonomy, as a way to help students develop higher order thinking.

A systematic school-wide approach to implement a thinking plan is under development at Hauraki Plains College and is a good way to ensure that we are all "reading off the same song sheet" or, to relate it to the charter, "We are all rowing in the same direction." So, where do we go to from here? The school-wide approach will be a continual emphasis. Perhaps it is time to try something different and experiment, to try new things, even if there is the danger of mistakes being made. I believe that to make mistakes and then learn from them is one of the best learning strategies.

The tension between specific subject based knowledge and the Key Competencies will need to be addressed. If we are to make thinking an emphasis, then time will be needed to teach students how to think. What content will be kept? What will need to be dropped? These decisions will be the tough decisions that will need to be made by different schools around the country. One possible idea is for junior classes to have a unit of work during the year where the Key Competencies are made an emphasis, perhaps in discovery learning, cross curricular format.

The question also arises as to how much of a driving force NCEA is. If we are to develop deep thinkers in Years 9 and 10, will this be knocked out of them in Year 11 during the feeding frenzy for credits?

Participating and Contributing, and Managing Self can be much more than students just doing what they are supposed to do. These Key Competencies can be developed in students in creative and dynamic ways. Teachers will need to work together in schools to find ways to develop these Key Competencies in their students. They will indeed be 'what we make of them'. Teaching them explicitly rather than hoping they are covered implicitly will be critical to their success.

This new curriculum emphasis has the potential to be an exciting, if not certainly a busy, time as a teacher; a time to shape the thinking that occurs in the students of our schools and in our own approaches to teaching.

The online forum and four week Wikipedia unit of work demonstrated the engagement that occurs when ICT is used as a focus in the classroom. Most students responded positively to the time out from their normal class work. Despite some difficulties with the research aspect of the activity and being blocked from editing, the resulting "Hauraki Plains" site on Wikipedia was a pleasing legacy.

The online forum, in particular, has the potential to be used to develop the Key Competencies of Participating and Contributing, and Thinking. The positive response to this activity was encouraging and, with strategies to ensure better buy-in from the students, this activity could be used in a variety of interesting ways.

The Wikipedia unit of work resulted in a collaborative classroom. The unit itself needed to be well structured and was taught in a teacher directed way. Despite the problems that occurred, the students were, in general, motivated. The Key Competencies that were expressed were dependent on the teaching approach and the tasks that were set throughout the unit. There is the potential for this type of unit to be used as a structure. For example, a content page could be developed on an historical character or a Science article could be researched and put onto Wikipedia. The Wikipedia activity I presented to the class was not based on previous knowledge and this was an advantage when it came to teaching this unit, which was not in my subject area.

For the Key Competencies to be an emphasis in the classroom, thought will need to be given as to how they can be taught, modelled and encouraged. A range of options to facilitate their introduction and teaching could be used: keeping a learning journal, video analysis, self and peer evaluation, goal setting and monitoring, role play to demonstrate the Key Competencies, a range of learning experiences and new contexts to develop students' thinking and self regulated learning or SOLO taxonomy as a way to encourage higher order thinking. The use of brain friendly structures in the classroom to encourage the "layered on" curriculum and to ensure the Key Competencies are integrated into lessons is another possible approach to their implementation.

The difficulties with identifying and observing the Key Competencies are many. To implement them effectively, they need to be observed. The internal attitudes and drivers are not easy to observe and any reporting on these will require care. Teachers must know their students well. This may seem obvious but in the hectic secondary school environment this is not always attained. The role of self assessment and peer assessment must take on a greater emphasis. The development of the Key Competencies across levels will also be a pressing question for schools. Solid professional development for teachers and resources for schools will need to be provided to ensure that this new emphasis is treated seriously and is not yet another grand idea minimally resourced.

The knowledge society is with us and our students need to be prepared to cope in a landscape that is continually changing. ICT is presently the catalyst of change and students tend to use it with ease. The challenge for schools and teachers is to make learning relevant and interesting. Real and engaging tasks using ICT engage students and this, together with a focus on developing the Key Competencies, may well prepare students for the changes they will face. My research is a small step revealing some of the possible difficulties and the potential of using ICT as a vehicle to promote the Key Competencies. Both the online forum and Wikipedia are possible ICT tasks that can engage and motivate students. They are also tasks that can allow the Key Competencies to be observed and taught to students.

The opportunities are endless and finding the right emphasis, driving motivation and approach to ensure that students are released into their learning and dispositional potential is the current challenge that awaits schools in New Zealand.

## **APPENDICES**

### **Appendix 1: Lessons Using Wikipedia and Kar2ouche**

#### **Lesson 1 - What is Wikipedia?**

Students go onto Wikipedia for one period and investigate the Treaty of Waitangi site. They are to fill in a worksheet and then, in the last 10 minutes of the period, report on the attributes of Wikipedia.

Before beginning the unit, ask the students what they know about Wikipedia and how it works.

Students have an understanding of the Wikipedia site for the Treaty of Waitangi and realise the possible structure and properties of a Wikipedia site.

#### **Lessons 2 & 3 - Wikipedia Rules**

Students work in groups of three to find out the rules and conventions of Wikipedia. Each group is assigned one of the following areas. They are to report back to the class next period using a 5 frame PowerPoint. Save the PowerPoint files in a shared folder.

- Overview
- Searching
- Editing
- Images and Media
- Policies and Guidelines
- Communication
- Resources and Lists
- Technical Information
- Other Wiki projects

#### **Lessons 4 & 5 - The Hauraki Plains and Ngatea Wikipedia Site**

Students in groups can examine the Hauraki Plains and Ngatea site on Wikipedia (10 minutes) and then as a class we can mind-map the site and what it contains. Using Inspiration mind-map software. See IT teacher and see if he can introduce this in a 10 minute slot.

Research Hauraki Plains and Ngatea site

Mind-map what is there

Mind-map Hauraki Plains possible information

Present information on Inspiration - present to class or print off and place in individual folders.

## **Lessons 6 & 7 - Research on the Hauraki Plains Area and Ngatea.**

Students work in groups on different aspects of Ngatea and the Hauraki Plains area. Some discussion on the importance of giving links to sources of information and examining how to search on the internet. Reliable sources are also discussed. Groups take responsibility for an area of research.

Class discussion on recording links and ensuring these are included.

Class session on searching the internet - introduce safe searching and competent searching. (dogpile, google, search engine).

Reliable sources of information are discussed e.g. up to date sites. Include a printed copy of your work in the folder.

## **Lessons 8 & 9 - Putting the Information Together**

Groups now put the information together and plan out how the information fits together for their part of the Ngatea or Hauraki Plains article. Photos can be taken during this stage. The format should be jpeg (this may need to be compressed and put up on the Wikipedia server). Students can bring their own cameras to school for this. Information can be typed up on the computers using Microsoft Word. Emphasis on a small amount of quality work.

Suggest they proofread the work or get someone to do this.

Information is gathered

Information sorted and put in format

Resources e.g. links and photos are gathered

Information is typed up on Word (Keep language and format consistent - class discussion on this?)

Groups will check each other's work and make suggestions in pencil? - Include a printed copy of your work in the folder.

## **Lessons 10 & 11- Expert Groups Developed**

Groups now go back to the Wikipedia site and become experts in the following areas, so that the site is constructed well:

- Table of Contents
- Word with a link
- Link - symbol
- Headings
- Adding images
- Editing
- Different coloured text
- Different sized text

## **Lessons 12 - 14 - Adding to the Wikipedia Site**

Groups work on a new mind-map to see what has been covered. Groups begin to edit the Wikipedia site and experts work on the format. Perhaps choose one editor per group? Talk about consistency of language and format of words.

New class mind-map

Editing begins and continues

Evaluation of the site, as a class - on data projector: May need to roster groups so that changes are made without information being lost.

Specialist editors may be assigned the task of completing the site over the next few days.

## **Lessons 15 & 16 - Kar2ouche and Self Evaluation**

Individuals fill in the Kar2ouche evaluation storyboards so that they can determine how they have performed this task in relation to the Key Competencies - Participating and Contributing, Thinking and Managing Self.

Students take photos of themselves

Place photos in Kar2ouche and evaluate themselves on how they have performed

Peer evaluation is also carried out

Class to view the finished Wikipedia site

## Appendix 2: Key Competency Indicators

<b>SELF MANAGEMENT INDICATORS</b>			
<b>CODE</b>	<b>AC</b>	<b>IA</b>	<b>FI</b>
<b>1</b>	Acting Appropriately	Ability to Reflect	Setting Personal Goals
<b>2</b>	Completing Tasks and Homework	Resourceful	Making Plans
<b>3</b>	Getting to Class on Time	Resilient	Striving for Excellence
<b>4</b>	Following the Rules / Instructions	Overcoming Hurdles	
<b>5</b>	Completing Work in Class	Interest in Learning	
<b>6</b>	Having Correct Gear (Organised)	Working Independently	
<b>7</b>	Listening Appropriately	Showing Initiative	
<b>8</b>	Staying On-Task		
<b>9</b>	Organising Own Materials		
<b>10</b>	Taking Responsibility		

<b>PARTICIPATING &amp; CONTRIBUTING INDICATORS</b>				
<b>CODE</b>	<b>AP</b>	<b>GR</b>	<b>CC</b>	<b>GP</b>
<b>1</b>	Active Participants in New Contexts	Balancing of Rights, Roles and Responsibilities	Answering Questions in Class	Collaboration
<b>2</b>	Uncharted Lands e.g. Novelty - Never done something like this before	Participation in Groups	Contributing to Classroom Discussion	Helping Others
<b>3</b>	Engagement - Enjoyment of the Task	Working as Part of a Group	Filling in Answers on the Board / Computer	Discussion
<b>4</b>		Learning from Others	Bringing Ideas from Home, Culture, etc.	Teacher and Students Co-solving
<b>5</b>			Taking Part in the Class	Listening
<b>6</b>			On-Task / Off-Task	Sharing Own Experience

<b>THINKING INDICATORS</b>					
<b>CODE</b>	<b>CT</b>	<b>IP</b>	<b>RE</b>	<b>CR</b>	<b>EV</b>
<b>1</b>	Critical Thinking	Information Processing (includes listening)	Reasoning	Creativity	Evaluating Product
<b>2</b>	Reflective Thinking of Self or Method	Researching	Describing	Generating Original Ideas or Products	Correcting
<b>3</b>		Providing Evidence	Explaining	Hypothesising	Editing
<b>4</b>		Organising	Giving Reasons	Applying Imagination	Changing
<b>5</b>		Enquiry Skills	Making Informed Judgments / Decisions	Seeking Innovative Alternatives	Revision & Changing
<b>6</b>		Seeking Clarification		Using Humour in the Unusual	
<b>7</b>		Experimenting		Demonstrating Awareness of Aesthetic Qualities	
<b>8</b>		Questioning		Is Not Afraid to Be Different or Wrong	

## Appendix 3: Sample of Data from Video Analysis

	TEAM 3			TEAM 7		
0-1						
1-2						
2-3						
3-4	CC6	CC5 CC6	CC5 CC6	CC5 CC6	CC5 CC6	CC5 CC6
4-5	CC6	GR1 GR3	CC5 CC6			
5-6	CC5 CC6					
6-7	CC5 CC6	CC5 CC6	CC5 CC6	GR2 CC6	GR2 CC6	GR2 CC6
7-8	CC5 CC6	CC5 CC6	CC5 CC6	GR2 CC6	GR2 CC6	GR2 CC6
8-9	CC5 CC6	CC5 CC6	CC5 CC6	AP3 CC6	AP3 CC6	AP3 CC6
9-10	CC5 CC6	CC5 CC6	CC5 CC6	AP3 CC6	AP3 CC6	AP3 CC6
10-11	GP3	GP3	GP3	CC5 CC6	GP3 GR1	CC5 CC6
11-12	CC5 CC6					
12-13	CC6	CC6	CC5 CC6	CC1 CC6	CC5 CC6	CC5 CC6
13-14	CC1 CC2	CC1 CC2	CC5 CC6	CC5 CC6	CC5 CC6 AP1	CC5 CC6
14-15	CC6	CC6	CC5 CC6	CC5 CC6	CC5 CC6 AP1	CC5 CC6
15-16	CC6 AP1	CC6 AP1	CC5 CC6	CC5 CC6	CC5 CC6	CC5 CC6
16-17	CC6 CC2	CC6	CC5 CC6	CC5 CC6	CC5 CC6	CC6
17-18	AP3	AP3	CC5 CC6	CC5 CC6	CC5 CC6	CC6
18-19	CC5 CC6	CC6	CC5 CC6	AP3 CC6	CC5 CC6	CC5 CC6
19-20	CC1 CC6	CC6	CC2 CC5 CC6	CC5 CC6	CC5 CC6	CC5 CC6
20-21	CC2	CC5 CC6				
21-22	CC6	CC6	CC5 CC6	CC6	CC6	CC5 CC6
22-23	CC5 CC6	CC5 CC6	CC5 CC6	CC6	CC6	CC5 CC6
23-24	CC5 CC6	CC5 CC6	CC5 CC6	CC6	CC6	CC5 CC6
24-25	CC5 CC6	GR1				
25-26	CC6	CC6	GP1	GR2 CC6	CC6	GR2 CC6
26-27	CC6	CC6	CC5 CC6	CC6	CC6	CC6
27-28	CC6	CC6	CC6	CC6	CC6	CC6
28-29	CC5 CC6	CC5 CC6	CC5 CC6	GR2 CC6	GR2 CC6	GR1 CC6
29-30	GR3 CC6	GR3 CC6	CC5 CC6	CC5 CC6	CC6	CC5 CC6
30-31	GR3 CC6	GR3 CC6	CC5 CC6	CC5 CC6	CC5 CC6	GR1 CC6
31-32	CC6	CC6	CC5 CC6	CC5 CC6	CC5 CC6	CC5 CC6
32-33	CC5 CC6	CC5 CC6	CC5 CC6		CC5 CC6	
33-34	CC6	CC6	CC5 CC6	GP3 CC6	GP3 CC6	GP3 CC6
34-35	CC5 CC6	CC5 CC6	CC5 CC6	GP3 CC6	GP3 CC6	GP3 CC6
35-36	GR3 CC6	GR3 CC6	GR3 CC6	GR2 CC6	GR2 CC6	GR2 CC6
36-37	GR3 CC6	GR3 CC6	GR3 CC6	GR2 CC6	GR2 CC6	GR2 CC6
37-38	GR3 CC6	CC6	GR3 CC6	GP3 GP5 CC6	GP3 GP5 CC6	GP3 GP5 CC6
38-39	CC6	CC6	GR3 CC6	AP3 CC6 GR2	AP3 CC6 GR2	AP3 CC6 GR2
39-40	GP3 CC6	GP3 CC6	GP3 CC6	GP4 CC6	GP4 CC6	GP4 CC6
40-41	GR2 CC6	GR2 CC6	GR2 CC6	GP4 CC6	GP4 CC6	GR3
41-42	GR2 CC6	GR2 CC6	GR2 CC6	GP4 CC6	GP4 CC6	GR3
42-43		GR2 CC6 GP3	GR2 CC6 GP3	GR3 CC6	GR3 CC6	GR3 CC6
43-44		GP1 GR3 CC6	GP1 GR3 CC6	GR3 CC5 CC6	GP3 CC6	GP3 CC6
44-45	GR2 CC6	GR2 CC6	GR2 CC6	GR3 GP3 CC5	GR3 GP3 CC5	GR3 GP3 CC5
45-46			GP6 CC6	GR2 CC6	CC4 CC6	GR2 CC6
46-47	GR2 CC6					
47-48	CC6	CC6	GR3 CC6	GR2 CC6	GR2 CC6	GR2 CC6
48-49	GP4	GP4	GP4	GR1 GR2 CC6	GR2 CC6	GR2 CC6
49-50	GR2 CC6 AP3	GR2 CC6 AP3	GR2 CC6 AP3	GR2 CC6	GR2 CC6	
50-51	GR3 CC6	GR3 CC6	GR3 CC6	GP3 GR2 CC6	GP3 GR2 CC6	GP3 GR2 CC6
51-52	GR3 CC6	GR3 CC6	GR3 CC6	GR2 CC6 GP4	GR2 CC6 GP4	GR2 CC6 GP4

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