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# **EXPLORING THE FRONT END OF NEW ZEALAND CURRICULUM IN STUDENT TEACHER EDUCATION: AN EXAMPLE FROM LANGUAGE AND MATHEMATICS EDUCATION**

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**ABSTRACT** *This paper reports on two components of a collaborative project conducted by members of the language and literacy education, mathematics education and social studies teaching teams at the Faculty of Education, The University of Waikato. The teams decided to research the implications of the front end of The New Zealand Curriculum document [NZC] (Ministry of Education, 2007). The front end of the document includes key competencies and a statement describing each learning area. The language and literacy team chose to explore student teacher understandings of the English essence statement and the way in which that learning area is structured. The mathematics education team explored student teacher understandings of and implications for the “thinking” key competency for the teaching and learning of mathematics. Data were collected through in-class observations and tasks, and the analysis of aspects of student assessment work. The findings highlighted the value of an explicit focus on a particular facet of the NZC along with the challenges student teachers experience in envisaging how this might play out in practice.*

## **KEYWORDS**

New Zealand curriculum, key competencies, assessment

## **INTRODUCTION**

Student teacher educators have an obligation to ensure that beginning teachers graduate with knowledge of relevant curriculum documents along with the expertise to work effectively with students (New Zealand Teachers Council, 2007). They have a responsibility to ensure student teachers have opportunities to develop expertise in planning, preparing for and supporting student learning of the outcomes that are validated within the mandated curriculum. Consequently the introduction of a new curriculum poses an implementation challenge for student teacher educators as well as for schools. *The New Zealand Curriculum* [NZC] (Ministry of Education, 2007) will replace the previous learning area curriculum documents as the basis for teaching and learning in the compulsory school sector in 2010. In anticipation, lecturers at the Faculty of Education, The University of Waikato have

been working with student teachers to consider the implications of the newer aspects of the curriculum such as the vision, values, key competencies, teaching as inquiry and school-based curriculum within their curriculum specialties. The *Curriculum Implementation Exploratory School Case Studies* research report indicates that these aspects are also a focus for ‘early adopter’ schools seeking to implement the NZC (Cowie, Hipkins, Boyd, Bull, Keown, McGee et al., 2009). These studies indicate that teachers and schools consider they are only just beginning to fully understand and develop pedagogical approaches that might lead to the student learning experiences and outcomes that are aligned with the NZC.

This paper reports on two of the three components of a collaborative research project focused on the “front end” of the NZC which was undertaken by members of the language and literacy education, mathematics education and social studies teaching teams as part of the teaching of curriculum papers in Semester A 2009. It addresses the findings from the language and literacy and mathematics education teams. Findings from the study reflect the importance of an in-depth and critical examination of the particular features of NZC coupled with a strong focus on supporting student teachers to transfer their understandings into planning and practice.

## **ORIENTING THE RESEARCH**

New Zealand has had a national curriculum since the 1870s. This has been revised at fairly regular intervals and consequently, schools are periodically faced with having to accommodate a new curriculum. The NZC built on the 1990s revision which consisted of an overarching curriculum framework (Ministry of Education, 1993) detailing achievement objectives organised into seven learning areas and eight levels from Year 1 of schooling to Year 13. Some components of the 1990s curriculum statements, such as the design of objectives and content for eight levels over 13 years of schooling, have been retained in NZC with little change. Major changes include a shift from “essential skills” to “key competencies” that integrate knowledge, skills, attitudes and values; expanded statements on values in the curriculum; the inclusion of five future-focused themes; guidelines on school-based curriculum design; a clearer vision statement; advice on pedagogy and on assessment, and a reduction in the number of achievement objectives in all learning areas. NZC “sets the direction for learning for all students while at school” (p. 7). Rather than being prescriptive, each school is charged with interpreting and fleshing out its framework to best meet the identified learning needs of their student population, in consultation with their wider school community. These shifts in expectations have implications for how beginning teachers might be prepared for their responsibilities to promote the learning of all the students in their care.

Korthagen, Loughran and Russell (2006), on the basis of an analysis of teacher education programmes in Australia, Canada, and the Netherlands, propose seven principles to guide the development of “responsive teacher education programs that make a difference”. One principle is that learning about teaching requires a view of knowledge whereby subject understandings need to be created by the individual. Another principle is that learning about teaching is enhanced when the teaching and

learning approaches advocated are modeled by teacher educators in their own practice.

Growing professionally is an ongoing process and it is important that new initiatives become part of new learning (Begg, 2005). Practitioner research endeavours to identify, understand and improve one's practice (Adler, 1993). This would seem to be essential when student teacher educators are guiding student teachers towards an understanding of the intent and practical implications of a curriculum such as NZC. When a curriculum is designed to be flexible and responsive to local concerns and interests practitioners need to engage in reflective practice. All the more so, when the full implications are likely to be emergent (Cowie, Hipkins, Boyd, Bull, Keown, McGee et al., 2009), and changes have to be represented by personal and collective experiences (Fullan, 2007).

### **The Exploring Curriculum in Student Teacher Education [ExCITE] study**

Developing student teacher understanding of curriculum and curriculum change is a strong focus within the teacher education programmes at the Faculty of Education, The University of Waikato. The ExCITE study emerged out of conversations about how we as teacher educators were working with our student teachers to help them appreciate and understand the intent and implications of the NZC across the breadth of their professional practice. We were aware that our current graduates would face the challenge of teaching a curriculum that they had not experienced themselves as learners at school and were concerned to support their knowledge, expertise, confidence and proficiency to implement the document.

The ExCITE team comprises a group of colleagues interested in undertaking research on ways of working with student teachers to help them understand the NZC. After much discussion, the team decided to focus their collaborative research on the implications of the front end of *The New Zealand Curriculum* (Ministry of Education, 2007) largely because this incorporates the newer additions to the curriculum such as the key competencies, a stronger focus on values, and elaboration of teaching as inquiry. This focus accommodated the diversity of interests within the team whilst at the same time ensuring there was a point of shared focus. The overarching research question that was agreed to by the team was: What are some of the ways that initial teacher educators work with the front end of the NZC?

Within the framework of the collective research question each curriculum group formulated their own research question and complementary research design. The group gained ethical approval for the overall project and for the individual projects within it. The language and literacy team of Marilyn Blakeney-Williams and Wendy Carss chose to explore student teacher understandings of the English essence statement and the way in which that learning area is structured. The mathematics education team of Judy Bailey, Ngarewa Hawera and Marilyn Taylor explored student teacher understandings of and implications of the "Thinking" key competency for the teaching and learning of mathematics. The social studies team of Pip Hunter, Paul Keown and Jill Wynyard investigated initial teacher educators' decision making as they planned and reflected upon the links between the key competencies and social inquiry.

While each curriculum team pursued their own specific research question the team as a whole met regularly, particularly in the initial stages of the project. Discussion at these meetings focused on aspects such as the meaning and pedagogical implications of the key competencies across the different curriculum areas including whether or not, and to what extent, the competencies might be generic or necessarily situated in a particular learning area.

In this paper we report the findings from the language and literacy and mathematics education teams. The ExCITE study was an extension of earlier research by the social studies team and so the findings of their investigation are reported separately in this special edition.

### **EXPLORING THE ESSENCE STATEMENT FOR THE LEARNING AREA OF ENGLISH**

By the time the current first year student teachers in a three-year degree enter schools in 2012, as provisionally registered teachers, they will find the NZC document fully implemented. The NZC aims to set the direction for teachers to design learning opportunities that will equip students to be competent 21st century learners. With the ever-increasing diversity of New Zealand students and the impact of technology the notion of literacy in English is changing (Limbrick & Aikman, 2005; Locke, 2002). It is therefore critical that initial teacher educators equip their student teachers with the competencies to understand and apply their knowledge of English in designing effective literacy practice for diverse learners. The Ministry of Education (2006) recognises English as a social process with emphasis on situational and socio-cultural contexts within a wider field of knowledge through the use of integrated modes of speaking, listening, reading, writing, viewing and presenting.

The learning area statement for English (Ministry Of Education, 2007) is therefore a holistic view of language learning where planning and teaching should focus on developing socio-culturally appropriate language, linguistic features, process skills and strategies within the context of school and classroom (Andrews, 2002). The statement encompasses three aspects: What is English about? (understanding); learning through the language (using); and learning about the language (creating oral, written and visual texts).

At the University of Waikato first year student teachers are introduced to the front-end of the NZC document; the vision, values, and key competencies, through a professional practice paper during their first semester at university. Paralleling this is the introduction to each curriculum learning area through individual papers. Student teachers need to understand the foundation of each learning area statement before unpacking the achievement objectives. For this reason the researchers in this case study decided to investigate the opening rationale statement of the learning area: English and subsequent underpinnings.

The study involved a sample of 20 first year Semester A student teachers (across two classes) enrolled in the *Learning and Teaching Language and Literacy* module of the Bachelor of Teaching programme at the University of Waikato. This paper encompasses twelve tutorials with paper readings and three micro-based teaching sessions in schools. The specific aim of the paper was to develop an

understanding of how children learn language and become literate with emphasis on major teaching approaches to language/literacy education.

For this research the questions explored were

1. How has understanding of the English essence statement developed over the duration of the paper?
2. To what extent does the student teacher assessment of children's learning reflect the underpinnings of process and strategies as identified within the English learning statement?

### **Methodology**

Two sources of data were collected. The first set of data included students' reflective statements collected at the beginning and end of the paper. In tutorial one, students wrote an initial statement on their beliefs of what English encompasses so that base line understanding could be established. The NZC document was introduced in tutorial five when lesson planning was introduced. At this point the rationale statement was explored and discussed. In tutorial twelve, student teachers wrote a final statement on what they now believed English was and why it should be studied. These two statements provided a comparison of views and understandings.

The second set of data was related to lesson planning and student teacher reflections of their lessons based on child response and teaching goals. They planned, taught and evaluated three micro-based sessions in schools but only the third fully evaluated lesson was collected and analysed for the purposes of this research. This lesson was based on the language experience instructional teaching approach (Ministry of Education, 2003; Ward, 2002). This approach follows the pattern or sequence of providing an experience that promotes discussion and conversation, followed by written recording of the ideas and then re-reading or sharing of the oral and written texts that have occurred. The approach relates well to the set of underpinning processes and strategies as stated within the English learning area statement: text purposes and audiences, ideas within language contexts, language features that enhance texts, and the structure and organization of texts.

### **Findings**

#### *Reflective statements*

Common themes were identified from the analysis of initial and final written statements on "what is English about" and "why study English". The initial statements showed that 75% of the student teachers believed that English is about reading and writing and that learning conventions such as spelling and grammar are critical. These were the only dominant themes at this point in time, whereas in the final statements, the student teachers had extended their understandings to include oral, written and visual language as means of communication. There was less emphasis on spelling and grammar. Final statements included a broader view of English such as "English is a way of expressing and communicating ideas to

expand and shape our identity”... “creativity and visual imagery are part of English”... “English is about speaking/listening, reading and writing, and visual presentation.” These comments reflect a developing continuum of knowledge where English was no longer viewed from a narrow perspective, but from a broader context of language and literacy. Examples of this shift in understanding include the importance of developing self-confidence and identity, the interaction between people and links to effective communication in society, and literacy as the foundation of all other curriculum areas. Such understandings are closely linked “to the study, use and enjoyment” of English teaching and learning (Ministry of Education, 2007, p. 17).

*Lesson planning and evaluation of lessons based on child response and teaching goals*

Student teacher assessments of children’s learning during the Language Experience lesson were analysed in terms of the underpinning processes and strategies as stated in the learning area English statement. Findings demonstrated their understandings of both making and creating meaning between the different modes of language. In terms of oral language there was a strong emphasis on forming and expressing ideas, accessing prior knowledge and experience, and reinforcing and extending vocabulary. This linked into the written mode as ideas were extended from discussion and recorded in a variety of ways. The importance of understanding how to bridge the transition from the experience and related oral language to written language was commonly articulated. One example from a student was, “When children are encouraged to experiment and explore and talk about what they are doing ... what is happening ... they react spontaneously and see the point in recording their thoughts and ideas.” Another said that, “oral to written language is more than the topic, it’s also about the purpose and the meaningful context that is provided” ... and a similar comment was ... “it’s all about making appropriate language choices in a variety of situations ... essential skills and strategies as separate exercises are a waste of time.” Such evaluations relate well to the learning area English statement which is structured around the interconnection of making and creating meaning in text-based activities whether oral, visual or written language.

*What have we learned*

Initially student teachers had a narrow view of English that developed during the course to encompass oral, written and visual language. By the end of the paper they came to see English as a vital means of communication and thinking. As one student stated, “Thank goodness the study of English is more than spelling and grammar, I’m actually finding it interesting.” Realistically this has the added effect of making them aware that they have much to learn and some of the challenges that are involved. This is evident in the following comment, “I can make the connections between learning intentions and NZC: English but I feel less confident in achieving this when it is not a tangible thing ... that is, open-ended rather than grammar, spelling and book analysis.”

The student teachers realised that working with children and meeting their culturally diverse needs, particularly those from non-English speaking backgrounds, is not an easy task. This is summed up by the following, “I have realised that children are so diverse in terms of oral and written language.” We learnt that the student teachers were highly motivated in terms of teaching using language experience for exploration, experimentation, developing imagination and creativity. They felt that the experiences empowered children to learn about and through language by engaging in authentic, meaningful activities. As students, this affirmed their planning and ways of working with children.

Another interesting point is that while visual language is reflected in final statements, this does not feature strongly within the evaluations of the language experience lessons. This is surprising given the type of activities that the student teachers self-selected and the means they chose for the written recording of these. Perhaps this is due to the nature of the teaching experience where oral language receives the greater emphasis. In the future it would be useful to strengthen awareness of the visual qualities that are encompassed within the approach.

This case study describes and analyses the development of student teachers understandings of the English learning area and the way this is reflected through the underpinning processes and strategies of oral, written and visual language. Through this process they moved towards a shared and more expansive view of what English is about and the reasons why we need students to study this. While the focus is on one instructional approach only, we feel that understandings may well transfer to others. This remains to be seen.

Our experience within this research project indicates that it is essential to understand the fundamental principles of the learning area and how they relate to planning and teaching. While there were only twelve tutorials in this paper, we feel it provided a satisfactory introduction to the learning area. As student teachers progress through their degree they are required to undertake two further papers in literacy education. During this time knowledge construction and understandings of the learning area English are further developed and consolidated with increasing sophistication and depth.

### **EXPLORING THINKING WITHIN THE MATHEMATICS AND STATISTICS LEARNING AREA**

The mathematics education research team explored the ideas of 28 (one class) second year student teachers about the “thinking” key competency (Ministry of Education, 2007). Prior to the data collection, this class had had six hours of instruction, spread over 2 weeks, with their lecturer exploring algebraic thinking. The intent of this instruction was to support the student teachers to develop and implement of a unit of work in algebra with year 7–8 children themselves. Some of the expectations of the course were that a key competency and appropriate pedagogical practices and learning experiences would be embedded within an algebra unit plan.

For this research the question explored was

*What sense are Year 2 student teachers making of the key competency “thinking,” and how are they intending to implement that competency within an algebra unit?*

### Methodology

Two sources of data were collected. The first set of data was taken from an in-class task where the student teachers worked in small groups of three or four. This particular task was designed to help scaffold their thinking about the possible implications of a key competency for their own planning. As part of an assignment they had to construct an algebra unit for micro-teaching with 3–4 children in a local intermediate school. This unit plan was based on the NZC expectations regarding key competencies when coupled with algebra. Copies of all unit plans were collected. These comprised the second set of data.

Because we were researching and assessing the unit plans, particular attention was paid to ethical issues to avoid a possible conflict of interest. The research process was carefully explained to the student teachers by their lecturer, a letter was given to each person in the group, and written permission sought and obtained. They were assured that non-participation in this research would not affect their assessment of their assignment.

### The In-class Task

As part of an in-class task, the student teachers were asked to read the statement in *The New Zealand Curriculum* (Ministry of Education, 2007) associated with the key competency, “thinking”. They were instructed to make a list of the different aspects of “thinking” as indicated in the document and summarised in Table 1. The student teachers were then asked to focus on two of these aspects of “thinking”, for example “creativity”, and consider “what might these aspects look like in their teaching and when children are learning?” For the third column they were asked to envisage and decide what “creativity” could look like in an algebra unit. The fourth column required the student teachers to imagine the possible implications that this might then have for their own planning. These questions provided the headings for Table 1. They worked in groups of three to four to complete this task.

**Table 1. Aspects of the “thinking” key competency**

What does NZC say about ‘thinking’? (Taken directly from NZC, p. 12)	What might this look like in our teaching and when children are learning	What could this look like in an algebra unit?	What are possible implications for my algebra unit?
Creativity Being a critical thinker Metacognitive processes Making sense of information Understanding experiences			



### **The Second Task**

The student teachers were provided with guidelines and a template for unit planning. They were required to independently design their algebra unit plans and include a statement that articulated how a specific aspect of one key competency from NZC would be developed. For example one student wrote “I will support my students to critically reflect on their own learning. Students will be encouraged at the end to ....”

All unit plans from the student teachers in this group were collected and photocopied. However, this study focused on the twelve unit plans that incorporated the key competency of “thinking.”

### **Findings: The In-class Task**

Overall, the student teachers found it challenging to link a particular aspect of the “thinking” key competency to an appropriate practical algebra task or activity. Of the ideas presented in the group statements about the “thinking” key competency, a variety of aspects were explored. For example, the statements indicated that three groups expanded on the implications of making sense of ideas and information and two groups developed the notion of making decisions. Interestingly, the idea of “metacognition” was not selected for consideration by any group.

Another aspect that one group considered was “developing curiosity.” Their suggestion (in column 3) was “*that children could use materials to see patterns and find rules*”. However, this group was not able to make explicit connections between using materials and developing curiosity about mathematics. They did not elaborate on what this might look like in an algebra unit. Another group endeavoured to link “creativity” to an algebra task. Their suggestion was to “*hook students into the activity by making the task relevant to them*”. There appeared to be an assumption that “relevance” would naturally engender creativity.

It was interesting to note that some of the suggestions made by the student teachers had a strong focus on themselves and what they could do as a teacher, rather than being able to think about the learner in the classroom. One example was that a teacher could “*use chocolate as a context for a fractions lesson.*” In this group’s view, it was the teacher who had to be creative. They did not appear to envisage their role as one of supporting children to be creative thinkers in mathematics. The student teachers’ statements indicated that synthesising the developing of creativity within the context of algebra was a challenging and complex task.

### **Findings from the Unit Plans**

From the 28 unit plans collected, 12 student teachers chose to link their unit plans to the “thinking” key competency. For the analysis, the unit plans were grouped into one of three categories as shown in Table 2.

**Table 2. The “thinking” key competency unit plan categories**

Category 1	Category 2	Category 3
Student teachers able to link <b>an</b> aspect of “thinking” to an opportunity for children to develop this. Could also plan steps for its occurrence.	Student teachers able to link <b>an</b> aspect of “thinking” to an opportunity for children to develop this.	Student teachers not able to link an aspect of “thinking” to opportunity or plan steps for its occurrence.
3	1	8

The majority of this group of twelve student teachers found it difficult to envisage how a key competency might be planned and enacted within a unit of work. Three, however, were able to state when children would have the opportunity to develop their chosen aspect of “thinking” and how this might unfold in their algebra unit. An example from Category 1 was when Catherine (pseudonym) stated she wanted to support her students to become critically reflective learners, and therefore made reference to that in her planning. Catherine noted specific times and steps to encourage children to critically reflect. At the end of each teaching session she planned a finishing activity where the children were asked to give an account of something they enjoyed, something they had learned and something they would like more practise within algebra.

Victoria (pseudonym), (Category 2) stated in her unit plan that she would focus on the development of the thinking key competency, and that it would involve students reflecting on their own learning. Whilst Victoria provided an opportunity within her planning for reflection to occur, she did not provide specific steps as to how she would enable this intention to be realised by the children. There was no evidence of questions or starters that might encourage the children to reflect. There appeared to be an assumption that the children would know how to do this without any guidelines or support.

There were eight student units in the largest group (Category 3). Carol’s (pseudonym) unit was a typical example. She identified an aspect of “thinking” that she wished to develop and wrote, “I want to support students thinking by giving them activities that require them to think creatively, reflect on their own learning ...”. However, she did not transfer this intention into her planning. There were no opportunities or explicit steps evident in her unit plan for supporting the development of creativity or reflection.

### **What have we Learned?**

A common theme that emerged was that most student teachers in this cohort had difficulty with writing meaningful statements about how they might develop the key competency within mathematical contexts. Several student teachers also found it a challenge to understand some of the conceptual ideas underlying the words used in *The New Zealand Curriculum* (Ministry of Education, 2007). “Metacognition” and “shaping actions” were aspects of the key competency of thinking that were

ignored. It may mean that the language and underlying ideas defining the key competencies will need to be explored in more depth prior to expecting any synthesis of them with mathematics learning.

The teacher is a powerful influence on what students learn, because s/he is a major decision maker (Klein, 1990). Implementing the key competencies has direct implications for what children will do in their mathematics lessons as because what a student teacher pays attention to will have a bearing on what is planned. Most of the student teachers found it demanding to envisage how a key competency might be planned and enacted within a unit of work. For example, Camille (pseudonym) wrote “I want to support my students to make sense of information, ideas, and experiences by providing them with a range of different contexts”. However, we would suggest that supporting students to make sense of information, ideas, and experiences is much more complex than simply providing a range of different contexts. We acknowledge though, that the complexities of planning and preparing a unit of work for mathematics learning that aligns with a key competency-in-action is not an easy process.

We have found that the introduction of a new curriculum document provided an opportunity to re-visit current practices (McChesney & Cowie, 2008) in initial mathematics education classes. As mentioned, the data from these student teachers showed that they found it challenging to formalise their thinking about the key competencies and how this might be implemented. This information has alerted us to the notion of being cognizant of student teachers’ need for support when expected to implement the key competencies into planning for mathematics learning.

## **OUR COLLECTIVE THINKING**

The NZC sets the broad direction for learning for all students while they are at school. Because each school is charged with interpreting and developing its own framework, initial teacher educators have a responsibility to ensure that student teachers are familiar with and appreciate some of the subtleties of the NZC as it might be enacted within their classrooms in the future. Student teacher educators have a role in supporting student teachers to reflect upon their own understandings of a particular subject, to appreciate what a curriculum is expecting of them, and to envisage what this might mean for their future practice.

In the case of the English team, this study indicated that having a broader view of what this subject could mean for teaching and learning, has led to an awareness that for student teachers there is much to learn about nature of curriculum area English and working with children. Exploring the essence statement first helped the student teachers to plan and implement authentic learning experiences for children. From the mathematics education perspective, beginning with an exploration of the intention of the key competency statements proved to be a useful place to start considering the implications of the NZC. It was then productive to focus onto what “thinking” was about and might look like in learning and teaching generally. From here the student teachers could then consider aspects of “thinking” in a mathematics context. We have become aware that we need to ensure that student teachers have clear understanding of the terms used in NZC (e.g. meta-

cognition, shaping actions) prior to expecting them to be able to tease out the ideas within a mathematics context.

## CONCLUDING COMMENTS

We have found that it has been worthwhile as initial teacher educators to participate and contribute to a cross-curricular project. We have been able to share and learn about different ways of integrating aspects of the front end of NZC whilst maintaining our own specific subject-based agenda. This experience has reinforced the need to continue to think deeply about the nature of our respective disciplines. A focus on the nature and place of the disciplines is a global issue within curriculum reform that seeks to meet the needs of diverse learners in a changing society (Kelly, Luke & Green, 2008; Wiles, 2009). It was important that our collaborative work moved beyond informal collegial dialogue to include the systematic collection and analysis of the data. The study has given us a deeper appreciation of the complexity of developing and synthesising the key ideas of the front end NZC with the learning areas. The study has also indicated the benefits of cross-disciplinary research to support our student teachers to implement aspects of the NZC in a critically reflective manner.

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