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N Wickramasinghe
University of Wollongong

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**A thesis
submitted in partial fulfilment of the requirements
for
the award of the degree**

Doctor of Education

**From
University of Wollongong**

**By
N. Wickramasinghe
(B.A., L.L.B. (Hons.), PGDE. (Distinction.) (Colombo, Sri Lanka)
PGDTE. & CD. (Simon Fraser, Canada), M.Ed. (Wollongong, Australia)
M.Phil. (Sri Lanka)**

**Faculty of Education
University of Wollongong
2004**

**A study
of the changes to Sri Lankan pre-service
teachers'
knowledge about teaching
during their student teaching period**

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Declaration

I declare that this thesis submitted in partial fulfilment for the requirements
for the award of Doctor of Education degree,
in the Faculty of Education, University of Wollongong.

I also certify that this is my original work unless otherwise refereed or
acknowledge and that it has not been submitted for a degree at any other
university or institute.

*This thesis
Is dedicated to*

my mother, Leelawathie Wijenayake Jayawardhana

and

late father, Don Martin Wickramasinghe

*Although denied the benefits of the education
they merited and deserved,
they always appreciated its value and supported
their children's education,
sometimes at considerable personal sacrifice.*

Abstract

This study investigated how a group of Sri Lankan pre-service teachers changed their understanding of effective teaching during the twenty days student teaching (student teaching) period of their teacher preparation program. In order to explore changes in their understanding across this period, two methods were combined: concept maps and structured interviews. The study involved twelve student teachers preparing for teaching in secondary mathematics and science as participants. The student teachers were asked to draw concept maps of effective teaching three times: prior to beginning their student teaching period, in the middle of student teaching, and at end of the student teaching period. Half of the participants received their previous maps before developed their second and third concept maps; the other half drew their maps without reference to previous maps. Shortly after they drew their concept maps, participants were interviewed at these three stages. These interviews were audio recorded. Data were triangulated from concepts maps and interviews. Based on these data, multiple case studies were developed. Using qualitative analysis, these case studies were used to identify the changes in the student teachers' understanding about teaching and the factors that influenced these alternations. The results of the case studies were used to interpret patterns of change in participants' understanding about effective teaching. The prominent change across the maps was that over the time the participants' views of effective teaching had broadened significantly. The simple constructions of their first and second maps had become much more complex, with more concepts, more levels and more cross links. In their interviews, the student teachers provided some possible explanations for the changes, including the nature of their school experience, the support provided by workshops at their college and own their own reflections. On the basis of the these findings the study makes several recommendations for developing Sri Lankan teacher preparation and some directions for further research.

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Chapter One

Introduction

Introduction

This thesis discusses concept mapping as a tool to examine changes in Sri Lankan science and mathematics pre-service teachers' understanding about teaching in their student teaching period. To achieve this, research questions based on the theoretical framework of constructivism and teacher knowledge were formed.

In relation to wider social and political changes in the educational field and new understandings of the most effective methods for preparing teachers, teacher preparation programs in Sri Lanka have placed a greater emphasis on the role of student teaching in preparing teachers (NATE, 2001). The student teaching period has been substantially extended with attention to the quality of supervision and guidance of student teachers. This has been accompanied by an increased provision of student teaching experience to improve student teachers' knowledge about teaching. Sri Lankan authorities therefore considered it necessary to examine and evaluate what is happening in the changing student teaching field. This study takes up these challenges by examining how student teachers construct and organise their knowledge about teaching over the period of their student teaching. This study also provides strategies for developing teacher preparation programs at National Colleges of Education (NCOEs) in Sri Lanka, and provides a reference point for further research in teacher education in Sri Lanka. Chapter One of this thesis presents the background and rationale and significance of the study and overview of methodology, definitions of the terms used, and also the overall structure of the thesis.

Teaching and the changing role of teaching

Over the past thirty years or so there have been some major changes in teaching and learning that have challenged the traditional school system and structure of teacher preparation programs. Students are no longer regarded as passive learners; they are expected to be active learners and problem solvers. Teachers too are no longer regarded simply, 'dispensers of knowledge', they are expected to perform a multitude of roles. Kizlik (2001) describes the different roles a teacher must enact:

As a teacher you will wear many hats. You will be a communicator, a disciplinarian, a conveyor of information, an evaluator, a classroom manager, a counsellor, a member of many teams and groups, a decision maker, a role-model, and a surrogate parent, to name but of a few of the roles teachers assume in carrying out their duties. (p.1)

In addition, there have also been major developments in the content and structures of school subjects over the past thirty years. For example, subjects are often no longer implemented as academic disciplines. A Lorentzen (1999) points out:

...traditional subjects like history and geography have taken into their curricula a number of aspects from the contemporary agenda of globalisation and need for democratic citizenship, while biology and other school subjects connected to the natural sciences have turned in the direction of environmental protection, both in the local and the global perspective. (p.1)

In many school contexts including Sri Lanka, biology, physics, and chemistry have been integrated into science and technology subjects, while geometry and algebra have been integrated into mathematics. These structural changes in subjects reflect and necessitate changes in the roles of both schools and teachers.

Schools are expected additionally to respond to the challenge of preparing individuals for life in the 21st century. These challenges require more innovative ways of learning (Bentley, 1999). Tom Bentley (1999), Director of DEMOS, Britain's leading independent '*think tank*' and one of their prominent educational thinkers, states that sustainable solutions must be introduced to meet the educational challenges of the 21st century. For example, Bentley states that connecting students with workplace learning opportunities creates skilful workers for the future:

By providing students with a structure that allows them to learn how to work, plus educational policies that encourage them to think and anticipate future needs, the youth of today who are the employment force of tomorrow, will be much better prepared to deal with an increasingly global and ever changing market. Current education policy cannot equip our students to deal with those sorts of demands (p.2).

According to Bentley (1999), the school should now help students move out of the classroom and into the workplace so they can develop a new set of skills and experiences to meet the contemporary agenda of globalisation. The Enterprise and Career Education Foundation (ECEP, 2001) argues that:

Connecting students with structured workplace learning opportunities in real businesses is one positive way of stemming the tide of youth unemployment and providing the workers of the future with a skills set that will help them become more attractive employees. (p.2)

According to Bentley (1999), meeting students' new set of needs means that government education systems now require a much stronger partnership with employers and community organisations. Structured workplace learning in real businesses (Bentley, 1999) has already been applied in British schools and in the Australian city of Newcastle, New South Wales where students studying for their Higher School Certificate (HSC) move between school and the workplace (Australian Broadcasting Co-operation, 1999). This pragmatic

approach recognises that schools must incorporate real life experience to keep up with the rapidly changing and competitive nature of the modern workplace.

With the need for schools to adopt more innovative ways of teaching, teachers must become more skilful and professional to remain effective in the future school. The report (UNESCO, 1996) states that:

A new teacher is at the epicentre of educational transformation. Teachers of the new millennium must be able to develop in their students the competencies and attitudes considered fundamental, such as creativity, receptivity to change and innovation, versatility in knowledge, adaptability to changing situation, discerning capacity, critical attitudes, problem identification and solution. (p.14)

It follows that teacher educators and teacher preparation programs must prepare student teachers to meet contemporary challenges. In the Sri Lankan context, the National Authority of Teacher Education (NATE, 2001) suggests:

...that reforms in teacher education need to be proactive in the determination of the 'new profile' for teachers in terms of new demands made on teaching competencies, skills, professional duties and responsibilities, personal attributes, attitudes and values. (p.2)

This new profile for teachers of the 21st century fulfils the skills and abilities suggested by the UNESCO (1996) report.

The student teaching (practicum) as a central component of teacher preparation

In the context of social change and challenges to teacher education, 'student teaching' (the practicum) as a major component of most teacher preparation programs becomes crucial (Jones & Vesilind, 1996). Literature written on

student teaching highlights its importance in developing student teacher abilities. According to Hammond (1994), it can help create a pathway from theory to practice and help student teachers understand the many professional roles related to teaching, schooling and the student learning process they will need to undertake. Moreover, it also helps construct knowledge useful for practice and ongoing theory building. It also assists student teachers to learn how to look at ‘the teaching world’ from multiple perspectives and use this knowledge to reach learners with diverse backgrounds.

Despite the importance of the practicum and its substantial benefits, Jones and Vesilind (1994) suggest that it is a concern for student teachers and can be a time of crisis for student teacher action. According to Jones and Vesilind (1996) little is known about how and what students learn during their student teaching experience. In technical terms, “little is known about the interaction of specific student teaching experience and student teachers’ construction of pedagogical knowledge” (Jones & Vesilind, 1996, p.92). This is the challenge taken up in this study with a particular focus on the Sri Lankan context.

Teacher preparation programs in Sri Lanka

Like most teacher preparation programs worldwide, Sri Lankan preparation programs have recently been undergoing changes to meet the requirements of contemporary global developments. The National Authority of Teacher Education (NATE), Sri Lanka, considered this global context when they were developing the new teacher education policy. According to the NATE report (2001):

...the new policy should focus on future while considering the effects of globalisation and the information technology wave on education, and society in general. ...these developments put a heavy responsibility on teachers to be innovators in education at every level in executing their roles. (p.2)

While taking due note of the global trends outlined above, the NATE (2001) report considered one particularly important issue, especially relevant to the Sri Lankan context. It was the role played by the “Guru” (the local name for teachers), which extends far beyond the teaching task in the school and is held in high esteem in our traditional society. Despite the impact of globalisation and IT, the teacher in Sri Lankan society will always be the most significant resource in the school system. Hence, the attitudes and values that Sri Lankan society have cherished should not be allowed to get lost in the global wave (NATE, 2001).

The NATE report (2001) sets a new Sri Lankan teacher education paradigm while taking account of the following issues: the impact of new trends such as globalisation and IT on the education system; teachers as innovators; the need to define new policies and criteria for selecting trainees and recruiting teachers; the redefinition of teacher roles within the framework of reforms in the education system; the need for a unified teacher education system that views initial and continuing education as a continuum—a life long process; the need to renovate the teacher education curriculum; and the need to promote democratic behaviour patterns in teachers and students at school level.

In keeping with the NATE policies, the National Institute of Education (NIE of Sri Lanka) has changed the teacher education curriculum. The NIE has been made responsible for curriculum development of all teacher education programs except university courses (NATE, 2001). In 2001, the National Institute of Education (NIE) introduced a new three-year Teaching Diploma course into National Colleges of Education (NCEOs) with a focus on creating a more active learning environment for pre-service teachers. As a first step, these changes were introduced into the science and mathematics courses. According to the new syllabus implementation document (NIE, 2001), student teachers are now expected to take more responsibility for their teaching and learning, and are being provided with more choices for learning. Student teachers are encouraged to develop their own individual perceptions about learning and

teaching and become more than what the traditional, passive model had required.

As a member of this project in curriculum and professional development of NCOEs at the NIE, the researcher is responsible for improving the teaching diploma course curriculum and other preparation programs. For this reason it has been necessary to closely monitor and evaluate what is occurring concerning the curricula and particularly the student teachers' learning during their student teaching period.

As well as NATE, the NIE recognises the importance of the practicum and the need for it to be evaluated (Hammond, 1994; Kudaligama, 2001). However, no previous study, and none of the studies currently being undertaken in this field in Sri Lanka focus on the changes in student teacher knowledge during their student teaching period. This study addresses this gap.

This study will make an important contribution to clarifying the role of student teaching (the practicum) in shaping students' understanding of teaching. This knowledge will improve future development in teacher preparation programs in Sri Lanka and provide a reference point for further research in teacher education in Sri Lanka.

The purpose of the study

The purpose of this study is to examine how the organisation of pre-service (mathematics and science) teachers' knowledge about their teaching changes during the student teaching (practicum) period in the teaching diploma program in Sri Lankan Colleges of Education.

Research questions

The following questions are used to guide the research.

1. How do pre-service teachers' knowledge and concepts of teaching, alter over the student teaching period?
2. What factors contribute to these alterations?

Theoretical underpinning of the study

To address these questions, the theoretical framework of constructivism is drawn on, as it applies to understanding changes in teacher knowledge and the methodological tools of concept mapping. Constructivism provides the theoretical framework for conceptualising how people learn and how they organise their knowledge; or more specifically, how “learners actively take knowledge, connect it to previously assimilated knowledge and make it by constructing their own interpretation” (Cheek, 1992, p.12). Constructivism and its features will be discussed in detail later in Chapter Two.

This research was designed to allow the researcher to examine student teacher understanding about teaching at different points in time during their student teaching period. Student teachers are expected to be able to construct their knowledge of teaching by integrating the theoretical knowledge gained from college coursework with 'real' school work experience, make their own interpretation and to organise their own knowledge of teaching. Student teachers therefore undertake and manage the process of developing an understanding about teaching. This study uses the tool of concept mapping to access students' different and unique organisations of their knowledge about teaching.

Methodology for the study

In this study 'concept mapping' is used as a tool to investigate how student teachers' knowledge is organised or constructed and reorganised throughout their student teaching period. Concept maps have been used in educational

studies to represent mental models of students and student teachers for over twenty-five years (Veenman, 1984; Beyerbach, 1985; Jones & Vesilind, 1996; Ferry, Hedberg, & Harper, 1997). In the study reported in this thesis, twelve student teachers in the second year of their teaching diploma course at the National Colleges of Education in Sri Lanka were asked to complete concept maps at different stages of their student teaching period. They were also interviewed and asked to explain their maps. Ten case studies based on the data from their maps and interviews were then developed. Using qualitative analysis, these case studies were used to analyse the changes in student teachers' teaching knowledge, and the factors that influenced these changes.

Definition of terms

Pre-service teacher preparation

According to Huber (1998) 'pre-service' refers to the period of time before an individual gains teacher certification and teaches in a school system.

The pre-service teacher

In this study, student teachers are those who participate in secondary level initial pre-service teacher preparation programs (mathematics and science) at National Colleges of Education in Sri Lanka (NCOEs).

Student teaching

According to Huber (1998, p.1) "student teaching is the extended period of time that a pre-service teacher spends practicing that art of teaching". It takes place in a natural classroom under the guidance of a mentor teacher and a university or college supervisor.

Student teaching is one of the major components of teacher preparation programs at NCOEs in Sri Lanka. The pre-service teachers who participate in the NCOEs teacher preparation programs complete two twenty-day (4 weeks) block-teaching periods which are separated in selected schools by a period of four weeks. The student teachers gain their first teaching experiences in this

block teaching. For the purpose of this study, this block-teaching period is known as *a student teaching period*. In the literature and in other contexts it may be referred to as the practicum (Arora, 1995; Blunden, 2000).

The assumption by NIE is that the student teaching is where student teachers put their theoretical knowledge into practice (NIE Curriculum implementation paper, 2001, p.6).

Change in organisation of teachers' pedagogical knowledge

According to Fullan (1982) change is a process made by individuals, not an event. For each individual, change is a highly personal experience which entails developmental growth. Change in this study therefore is operationally defined as any alteration, modification or transformation in the practice, attitudes, beliefs, and perceptions of participants. As such, change is something participants decide to make based on their own worldview.

Plan of the thesis

This thesis contains five chapters with the following sub-topics included in each. Chapter One presents an overview of the study, including background and rationale, issues related to the problem, significance of the study, research questions, theoretical underpinning, methodology and a definition of terms.

Chapter Two contains a literature review and theoretical framework, and focuses on the concepts of 'teacher knowledge' and the organisation of that knowledge. It also discusses the conceptual tools used here to assess teachers' knowledge of teaching.

Chapter Three presents the study's methodology, including descriptions of the participants, design procedure for data collection, and the analysis methods used.

Chapter Four and Five presents the data as case studies, which were collected from the concept mapping exercises and structured interviews.

Chapter Six presents an interpretation of the outcomes of the research questions, and the conclusions and recommendations emerging from the research.

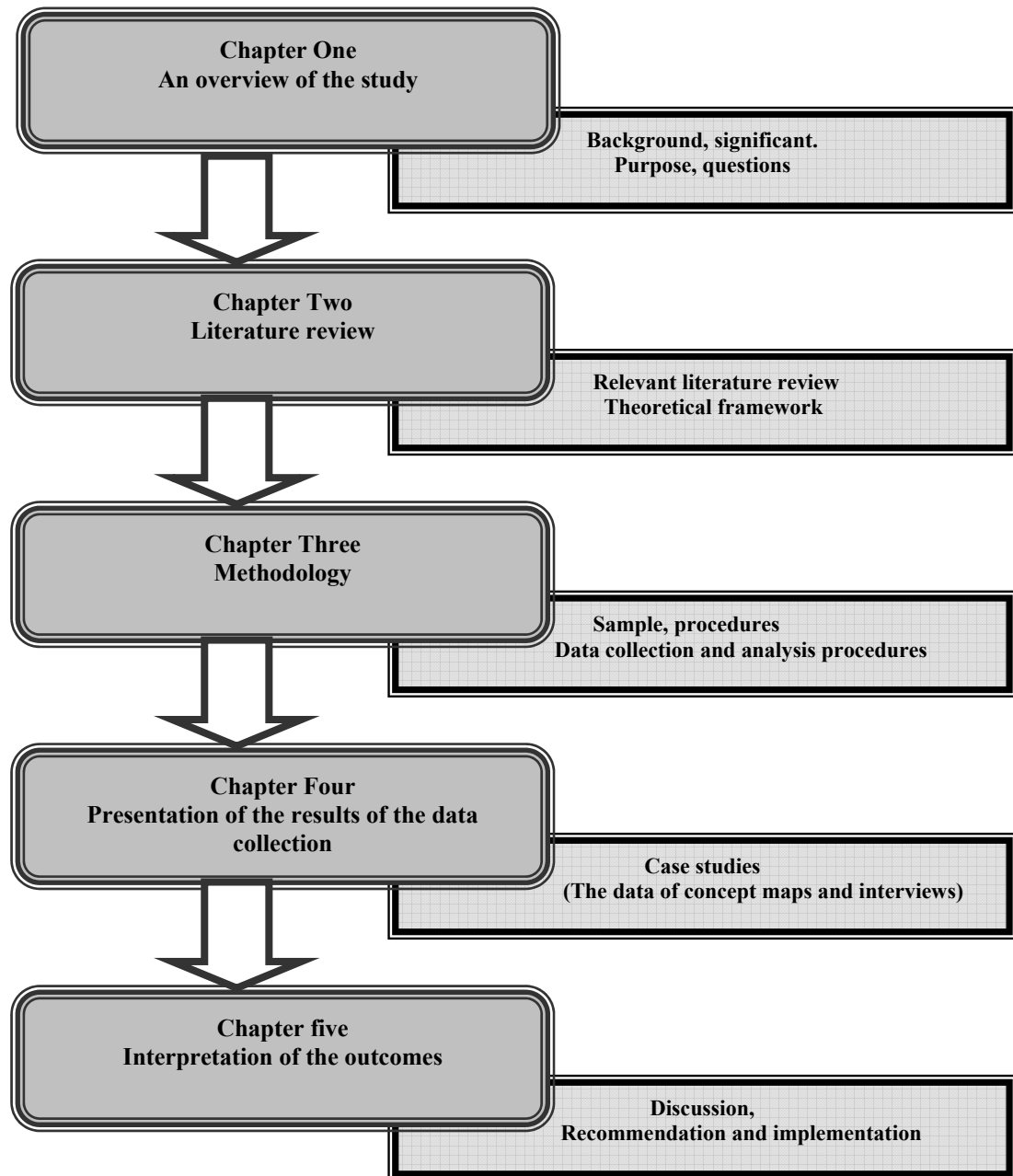


Figure 1.1. An overview of the thesis

Chapter Two

Related Literature, and Theoretical Underpinning of the Study

Introduction

As explained in the preceding chapter, this study focuses on how a group of twelve mathematics and science pre-service teachers organised and reorganised their knowledge of effective teaching during the student teaching period of their teaching diploma course. This chapter will review some of the current literature related to the topic and will discuss the theoretical aspects of this study. The chapter begins with the literature on teacher preparation programs and especially the student teaching (practicum) component. It then discusses constructivism as the major theory underpinning the research as it attempts to understand how student teachers develop their knowledge about teaching. It also reviews the ways that knowledge has been theorised and defined by Shulman (1986, 1987) and others, and considers whether Shulman's model of teaching, with its 'teaching cycle' is a suitable way to demonstrate teachers' knowledge. Finally, theory of knowledge organisation and its changes are considered, particularly concept mapping as a research tool to examine how student teachers organise their knowledge.

This chapter is organised under the following sub-headings.

- Teacher preparation programs
- The student teaching
- Student teaching period in the Sri Lankan context
- The nature of the teacher knowledge
- Teacher knowledge as personal and context specific
- Knowledge organisation and organisational changes

- Knowledge organisation and concept mapping
- Summary

Teacher preparation programs

There is considerable debate and a range of views on the contribution of teacher education programs to the preparation of teachers. This is further confused by different terminologies and different emphases as to what is important about teacher education. Jones and Vesilind (1996), for example, describe teacher education as consisting of two major components: theory and practice. The 'theory' component helps student teachers gain a good understanding of the subjects they are going to teach and their pedagogy, and 'practice' is associated with field experience. It is assumed that during the practicum student teachers can put their theoretical knowledge into practice. In other example, Kieft (1998, cited in Kudaligama, 2001) draws on Shulman's concept of 'pedagogical content knowledge' to suggest that teacher preparation programs have two main elements: developing an understanding of the subject that will be taught (the content); and the pedagogy, that is, the 'how to part of teaching'. Kieft (1998, cited in Kudaligama, 2001) further suggests that teacher education programs are designed to help teachers know and understand what motivates a pupil to achieve; to help teachers assess whether students are learning and applying that knowledge to improve their academic achievement; to develop the skill to manage a classroom; and to prepare for the diversity of students they will face in the classroom. They try to develop student teachers' understanding of the different roles and responsibilities associated with the teaching profession, clarify current beliefs and assumptions, and begin to develop a teaching mentality as well as appreciate social, cultural, and community contexts, and their crucial roles in schools.

Other researchers write about teacher preparation in terms of teachers' socialisation; that is, "the process whereby the individual becomes a participating member of a society of teachers" (Zeichnew & Gore, 1990, p.2). According to Lortie (1975) the best teacher candidates become socialised into the profession during the student teaching period. He writes:

Teacher socialisation occurs mainly due to the effective interrelation within the school context. ...during the time they spend in the classroom, while in close contact with school personal and other teachers. (p.3)

However, Lortie (1975) also points out that formal education has little impact on anticipating socialisation. Other studies also point to the inadequacy of teacher preparation programs and to the difficulties and challenges may face, Cassandra (1997) for example, writes:

There is a criticism of teacher education that focuses on teachers' inadequate lack of knowledge in subject matter areas, teacher inability to engage students and to motivate them and teachers' inability to translate knowledge into meaningful understanding for students. (p.2)

Darling-Hammond and Ball (1997) comment on:

[the] inadequate preparation of teachers to teach, nearly one fourth of all secondary teachers do not have even a minor in the main area they are assigned to teach... this situation can seen with more than thirty percent of the mathematics teachers and seventeen percent of the science teachers. (p.3)

Several studies have been undertaken to identify the areas which teacher preparation programs need to develop to be effective (Darling-Hammond & Ball, 1997; Cassandra, 1997). For example, Darling-Hammond and Ball (1997) suggest that teacher knowledge of subject matter, knowledge about student learning and knowledge about teaching methods make the most significant contributions to student. In other research, Poter, Garet, Desimone, Yoon and Birman (2000) found that teacher preparation was effective when it focused on specific higher teaching strategies, such as instructional methods

for higher-order learning and use of assessment strategies for higher-order student learning.

On the basis of their study of beginning teachers, Loughran, Brown and Doecke (2001) show how daily teaching presents new and significant responsibilities for which teachers cannot be prepared in their initial teacher training. Their study investigated how teacher preparation programs influenced beginning teachers' development especially during their early years of teaching. They interviewed twenty-two beginning teachers, one-to-one and conducted small group interviews at the end of third term and at the commencement of the beginning teachers' fourth term of teaching. They asked the teachers about their perceptions of how well they were prepared for their first year as full-time teachers.

Loughran et al. (2001) found that the participants in their study “consistently refer to changes in their understanding as a result of extended teaching experience” (p.20). They concluded that learning about teaching in teacher preparation programs need to be explicitly linked with experience as a potential teacher. According to Loughran et al. (2001), preparation programs create opportunities for student teachers to learn through experiences, but these programs cannot teach experience, and this “practical experience can purposefully inform student teachers’ learning about teaching through an enhanced emphasis on the *need to know*” (p. 20).

Furthermore, Loughran et al. (2001) show the importance of practical experiences:

It may be a starting point for student teachers to continually look ahead to the possibilities associated with changing context and to mentally signpost for themselves journeys that they may take in the future. (p.20)

They argue that preparation programs must not be designed as an end in themselves because only during teaching experience can beginning teachers gain an understanding of their responses to their own actions and needs during their preparation programs. They argue that this is necessary because often student teachers' views of teaching may be too simplistic, based upon ideas of 'telling', 'showing' and 'remembering' rather than on the development of understanding.

McCray (2000, cited in Kudaligama, 2001), also point to the impossibility of teacher education programs preparing students for the 'real' world of teaching:

Teacher preparation programs cannot prepare teacher candidates for all eventualities they will encounter given the complexity of educational setting; the relationship of teaching to larger social issues and values, and the connection between teaching and one's personal experiences and philosophies. (p.4)

However, they do provide some directions as to how student teachers might deal with such complexities:

The goal of preparing them to engage in contextual reflective practice, however, will promote lifelong learning aimed at recognising needs of students and schools and encourage staff toward solution to education problems. (p.4)

Other studies also point to the importance of opportunities for reflection. For example, Trotman and Kerr (2001), working from the assumption that pre-service teachers tend to use their personal experiences as critical filters in accepting and integrating course content, conducted a study that structured the content and experiences of a Graduate Diploma of Education unit to integrate personal life histories with other views and perspectives. Trotman and Kerr's (2001) study provided evidence that pre-service teachers tend to use their

prior experiences to filter course content and practice, in ways that led to unthinking acceptance of traditional teaching. They used journal writing to encourage students to challenge theoretical course content and to develop independent thinking about teaching practice. However, they conclude:

We also realised with regret that we had under utilized discussion in the linkage between journal writing and perspective transformation. Due to time constraints, the process of writing the journals was rarely the object of extended discussion in tutorials.
(p.169)

Kugelmass (1999) used autobiographical storytelling, personal myths and visual imagery as strategies to address student teachers' 'subconscious resistance' to new instructional practices (p.190). She suggests that:

Examining both intellectual and affective responses to the dilemmas they face in moving from theory to practice can assist students in resisting their own resistances to exploring new ideas that challenge established practice and traditional belief systems.
(p.193)

The student teaching period

The literature discussed above points to the importance of field experience as one of the major parts of a teacher preparation program. Arora (1995) suggests, “work site or in-plant experience forms the core of any professional program” (p.2). In the profession of ‘teaching’, the terms used for such experience are 'school experience', 'teaching practice', 'practice teaching', 'student teaching', 'the practicum' and 'internship'. The terms used are not always interchangeable, as Arora (1995) points out in the following:

The concept of Practice Teaching, has gradually given way to 'school experience', which is more comprehensive and professionally sound than Practice Teaching, as it attempts to provide experiences to the trainees in respect of all tasks a regular teacher is called upon to perform, while the 'practice teaching' program is confined to only one task that is 'classroom teaching'. (p.2)

The concept of post training 'internship' has not gained currency yet in the teaching profession but the term is sometimes used for 'school experience', which is organised for a few days or few weeks during the program. (p.2)

Arora (1995) describes those terms in relation to the Indian context, however, as Dobbins and Mitchell (1995) point out,

[t]wo recent trends in teacher education in Australia have been partnership and internship or the extended practicum. Both of these trends are underpinned by recognition of the importance of site-based learning as part of teacher education and professional development. (p.1)

In the Sri Lankan context, the concept of 'Practice Teaching' is used for gaining preliminary experience in the school. Generally, practice teaching is conducted for one day per week during the second semester of the first year of the preparation program. In addition, there is a 20-day of 'block teaching' and a one-year 'internship' period. The block-teaching period is identified as 'student teaching' period, and takes place in the second year of the preparation program. Student teachers participate in one year full-time teaching, which is called 'internship', in the school in the third year of their preparation courses.

Like other writers (e.g. Blunden, 2000; Brandanbury and Ryan, 2001), Arora (1995) claims that the practicum is the most important component of the teacher preparation program. He describes the practicum as involving the integrated and collaborative efforts of the student teachers, school co-operative teachers or mentor teachers, and college/ university supervisors. There is, however, some debate over the various roles played by teachers and university supervisors and the relative impact of each on student teaching. Hebiton, Yukich and Keegan (2002), for example, conducted a study which sought to ascertain perceptions of field experience programs. The academic staff of the university or college questioned whether the supervision of pre-service teachers was really necessary (Hebiton, Yukich and Keegan, 2002). However, most of the teachers surveyed supported the need for university supervision of pre-service teachers on a regular basis during their practicum period. Hebiton et al. (2002) identified the need for supervisors as mentors, role models, and advisors during the students' field experience. In addition, the teachers wanted clear guidelines from the university supervisors, more visits and accessibility during their practicum, and assistance when assessing student teachers.

Among some university academics there has been a concern that pre-service teachers' practicum experiences are "fundamentally conservative, emphasising preparation for the status quo" rather than based on a core of reflective practice, action research and professional development (Down & Hogan, 2000, p.14). For example, Down and Hogan (2000) examined the final semester field experience of fourth year education students to discover "the impediments and possibilities of teacher education" (p.14). The internship program was designed to challenge students' assumptions and practices and to encourage a broader and more critical approach to educational issues. They found that the program enabled pre-service teachers to "design and negotiate their own professional development plans" in many educational settings (p.14). According to the authors, this program contributed towards improving the internship as an opportunity for self-directed personal professional development, rather than

having pre-service teachers' practicum experiences only reinforce the status quo.

Despite these reservations, the literature points to a number of benefits of the practicum; for example, the following: professional practice, developing competencies through participation, developing on-the-job performance and integration into work experience (Hughes, 1998). Other benefits are the opportunities for student teachers to apply their theoretical knowledge to their future work place, and to conform or adjust their career decisions. The practicum also begins student teachers' socialisation into the teaching profession (Cooper & Orrell, 2000, p.1). Cooper and Orrell (2001) argue that: "practicum are beneficial for students to conform or adjust career decisions and for their initial socialisation into the profession or vocation" (p.1).

Hebiton et al. (2002) also point to the value for pre-service teachers of receiving one-on-one guidance and instruction and immediate feedback on their performance. Lave and Wenger (1991) argue for the importance of student teachers learning about teaching by sharing their experience with other teachers. Cochran-Smith and Lytle (1993) point to the potential of the practicum as an important site for a variety of sources of knowledge about teaching through the use of journals, classroom studies and oral inquiry processes. Gimbert (2002), for example, explored the experiences of six pre-service teachers who participated as intern teachers for a full year, to determine how they learned to teach. Gimbert (2002) found that the interns spent a lot of time reflecting with many members of the practicum school community: "They reflected with children, mentor teachers, peer interns, university faculty, school administrators, building professionals, and parents" (p.8).

Although it has been claimed that student teachers often report that the practicum experience is the most enjoyable component of their course (Bradannbury & Ryan, 2001), the practicum is not always free from difficulties

and problems. As Hughes (1998, cited in Brandenbury & Ryan, 2001) argues, there can be tensions and challenges posed by the practicum:

The student wants to learn, but above all he/she also wants to make the best impression possible. No student in this situation wants to reveal their inadequacies and fumbling attempts at developing task skills, yet these are exactly what the employer is on the lookout for. (p.219)

Hughes (1998) also points to tensions in relationships and divergence of interests, particularly when pre-service teachers are practicing in their possible future workplace:

Tension may arise from the fact that a student may be hoping to gain future employment at the work place involved, and wanting to make a good impression, and therefore may be unwilling to display lack of knowledge or skills. Many student teachers suffer tension stating that they feel they need to be pretend teachers from the beginning, unwilling to admit their weaknesses and their need to learn. (p.2)

In addition, successful management of the practicum can be highly problematic. According to Groundwater-Smith, Cusworth and Debbins (1998), the practicum is now conceptualised and structured differently compared to the past. Addressing these issues they point out that:

it is important to understand that as there have been changes in regard to teacher's work and school practices, there have been and continue to be changes in how the practicum is conceptualised and structured. Thus, the practicum is different now to what it was,

and indeed, how it may have been, for many of the teachers with whom you might work. (p.153)

According to Groundwater-Smith et al. (1998) the practicum is where student teachers traditionally put their knowledge into practice, where “student teachers were often placed in classroom to sink or swim” (p.154). However, this practice has now been changed and Groundwater-Smith et al. (1998) see and acceptance that “making it on one’s own in student teaching is not the same as learning to teach” (p.154). Accordingly, student teachers try to learn while they are practising their knowledge, and therefore, current student teachers' practicum experiences may be very different from their supervising teachers' past practicum experiences. For these student teachers the primary purpose of the practicum was to put theory into practice (eg. ‘practice teaching’), where the focus was on the exclusive development of skills and techniques (Groundwater-Smith et al., 1998, p.154). However, today it is equally important to ensure that the student teacher develops what Meere (1993, in Groundwater-Smith, 1998, p.154) calls ‘personally owned professional knowledge’, which links their prior knowledge, gained from experiences and background, to their theoretical knowledge gained at university or college. In this way the overall focus is on their learning, rather than on their teaching and their students’ learning. Groundwater-Smith et al. (1998) describe this as follows:

In many universities in Australia and overseas practicum experiences are changing to accommodate the focus on student teachers’ learning. Traditionally, practical experience in teacher education has focused almost exclusively on student teachers’ teaching and learning of the students they teach. The focus has been on you adopting the role of a teacher instead of a student. This of course, is a very important transition but you must remember that at the same time as you are teaching you are also learning. (p.154)

This is a very important point to consider when developing new preparation programs and upgrading the current teacher preparation programs, because student teachers can enhance, change, organise, and reorganise their knowledge of teaching throughout the student teaching period. This study, therefore, seeks to examine how student teachers change in their understanding of teaching over this.

Student teachers however often struggle to translate their theoretical knowledge into meaningful classroom practice (Ho & Toh, 2000). This is because the knowledge domains comprise general and personal pedagogy as well as personal beliefs, purposes and values. From Ho and Toh's (2000) study, general pedagogy is referred to as knowledge built upon the previous knowledge of teachers. The personal pedagogy represents the knowledge gained from personal beliefs and values. Ho and Toh (2000) conducted in-depth case studies with four student teachers who had recently completed one term of their teaching practicum in secondary schools, as a part of their Post Graduate Diploma in Education course in Singapore, to determine how their knowledge and beliefs impacted on their classroom practices. They found that "reflection is the key to understanding these intertwining relationships" involving teachers' knowledge and beliefs about their classroom practices (Ho & Toh, 2000, p. 3). While the findings of this study may not be new, they pose new challenges for future studies such as: How do teachers develop their teaching knowledge? Can teachers simultaneously develop their various knowledge domains? Are there distinct stages of development? These are very important points to consider in understanding the development of teachers' knowledge. The current study therefore attempts to examine how Sri Lankan student teachers develop their knowledge about teaching during the practicum period.

Student teaching period in Sri Lankan context

Within the Sri Lankan context, teacher education authorities believe the student teaching is the most important component of any teacher preparation programs. The National Colleges of Education (NCOEs') teaching diploma courses have a four-week (20 days) student teaching program and a one-year internship program. This four-week 'student teaching' period commences in the second year and the student teachers usually complete their internship in the third year of their diploma course. This student teaching period focuses on developing student teachers' skills in teaching. To achieve this all school and college resources must act and collaborate together, especially mentor teachers, the principal, other teachers in the practicum site as well as college supervisors and practicum coordinators. The following diagram shows how these resources focus on the student teacher.

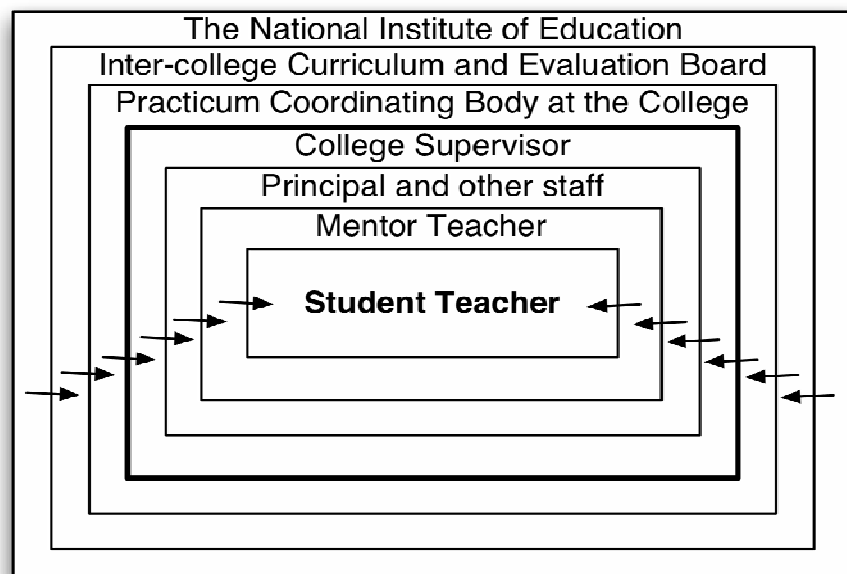


Figure 2.1. Student teacher-centered practicum program

In addition, there is a supervisory program at the practicum site for professional guidance and support. This process mainly involves student

teachers, college supervisors and the mentor (classroom) teacher, although the principal and other teachers occasionally contribute. It is expected that these people should be working together to develop student teachers' professional skills. Therefore, effective supervision allows each one in the supervisory process to interact with others. This process involves decision-making, analysis, and reflections. Therefore, this can be seen as a learning process aimed at developing student teachers. According to the NIE new curriculum implementation document paper (2001, p. 5) student teachers, mentor teachers and college supervisors must be committed, because this supervisory process is necessarily interactive in nature. The following diagram shows this interactive process.

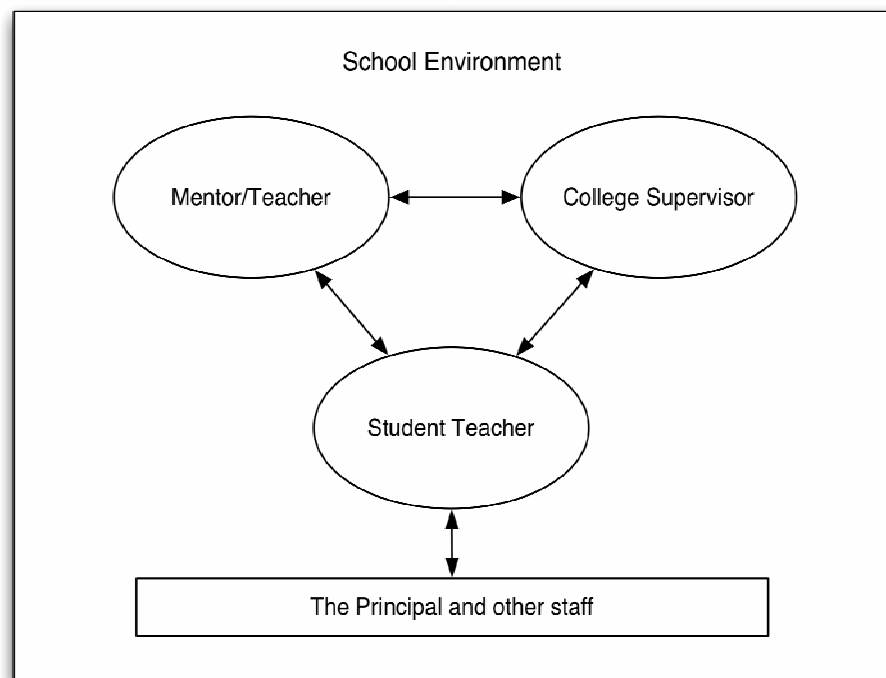


Figure 2.2. Supervisory program of the practicum

Within the school environment, the student teacher may be influenced by a number of individuals. This can be the college supervisor, the classroom or mentor teacher directly in contact with the student teachers, and also the principal and other staff members. All these influences may have an invaluable

effect on the experiences and perceptions of the student teaching and the teaching profession for the student teacher.

The nature of teacher knowledge

Discovering how the student teaching period enables student teachers to organise, reorganise, and change their knowledge is the basis of this research. In this section it is argued that the processes and mechanisms of constructivism provide the means to understand how student teachers learn and gain knowledge about teaching. First, it will be shown that constructivism is a suitable theoretical base for this study, then the discussion will be extended to teacher knowledge, including ‘Shulman’s knowledge-based model’ and its ‘teaching cycle’.

Constructivism

Understanding how knowledge is constructed, organised, and changed is central to understanding how pre-service teachers organise their knowledge of teaching. Constructivism is a theory of knowledge that focuses on the nature of knowledge and how we come to know (Von Glasersfeld, 1997). From this perspective, individuals construct knowledge through their interactions with their environment. It is suggested that participants in the current study organise and reorganise their knowledge through the new experiences provided by the practicum site. They integrate their knowledge gained from their experience of school and real classrooms with their existing knowledge, and make new meaning about teaching and learning. Researchers on teacher education and cognitive knowledge organisation and cognitive management fields (Merill, 1991; Cheek, 1992; Books & Books 1993; Gray, 1997; Von Glasersfeld, 1997) over the last fifteen years have used and recognised constructivist theory as a powerful tool with which to examine the organisation of pre-service teachers’ knowledge about teaching.

The main focus of constructivist theory is the nature of knowledge and how learners come to construct their knowledge. This is mainly seen as the process of making concrete meaning out of experiences by searching for patterns, raising questions, and building personal models, concepts and strategies (Von Glasersfeld, 1997). “Meaning and understanding thus become the goals of the learner rather than just acquiring behaviours or skills” (Von Glasersfeld, 1997, p.10). From this perspective, knowledge is not discovered or collected through instruction that does not correspond to the learner’s objective reality or real life environment:

While knowledge and application of technical skills, theories, principles, and concepts are important; the constructivist wants less emphasis on a more mechanistic approach to teacher education. The constructivist would like to see teacher education designed to incorporate more cognitive flexibility, critical analysis and personal construction of student teachers’ knowledge about teaching. (Cunningham, 2002, p.1)

Constructivism is an educational philosophy based on observation and scientific study of how people learn (Gray, 1997). According to constructivist theory, people construct their own understanding and knowledge of the world through experiences upon which they then reflect. Gray (1997) states that learning occurs when learners are actively involved in a process of meaning and knowledge construction rather than just receiving information.

When people encounter something new, they reconcile it with their previous ideas and experience, they may then change what they believe, or may discard the new information as irrelevant. In any case, people are the active creators of their own knowledge. To do this, they must ask questions, explore, and assess what they know, which means the student has more responsibility for learning and more choices regarding their learning. (Gray, 1997, p. 2)

As Brooks and Brooks (1993) state, learning is a self-regulated process, where learners construct their own knowledge by connecting new knowledge with their prior knowledge. A learner's cognitive structures are organised and reorganised to accommodate their new understanding and meaning (Brooks & Brooks, 1993). Therefore, knowledge is not something that can be simply transmitted from instructor to learner, because each person must construct his or her own knowledge according to his or her own background, environment and construction processes. Each learner will build and create knowledge according to the meaning they attach to it (Kelly & Wilberg, 1992; Gray, 1997). Kelly and Wilberg (1992) and Gray (1997) argue that the learning experience is thus a process of adjusting mental models to new experiences. As, Zanting, Verloop, Vermunt (2003) point out "[t]he term 'knowledge' does not refer to an objective scientifically proven knowledge base, but the personal knowledge constructed by individual teachers" (p.198).

In this particular study, student teachers, as learners in the teacher education field, construct their own knowledge of teaching as they experience and solve classroom and school-related problems. Ultimately, the student teaching period or practicum is an important time for gaining new experiences to develop prospective teachers' knowledge about teaching, whilst also gaining new experience at the school. A fundamental assumption of this study and the methodology used to track changes in students' understanding is that the student teachers organised and reorganised their understanding about teaching throughout their student teaching period. Concept maps that make it possible to identify how they change their understanding about teaching over the time.

According to Von Glaserfeld (1981), when student teachers compare new experience gained from school, with their existing knowledge, several things can occur. If the new information fits into their existing knowledge then it improves their understanding or meaning. If it does not match their previous knowledge, then they need to reorganise or change their existing knowledge or

understanding, or it may simply be ignored, rejected, or put aside until it gains meaning in the future.

To summarise: a constructivist perspective is generally very useful for understanding student teachers changes about teaching. In this study, the learners in the teacher preparation course are in the process of creating their own understanding of teaching while resolving real school problems related to their teaching practice.

Different views of teacher knowledge

The essential focus of the current research is on how student teachers organise and reorganise their knowledge about teaching during their student teaching period. It is therefore unique to look to the ways a successful teacher acquires and organises knowledge. Because teachers have a wide variety of knowledge they can use with their students, it is helpful to divide teachers' knowledge into its characteristics or constituents to understand how it is organised. This teacher knowledge section, therefore, provides a review of the different ways teacher knowledge has been defined and the different components which have been proposed as important to effective teaching. In particular, Shulman's (1986; 1987) knowledge based model will be discussed as well as its 'teaching cycle'. Shulman's work provides the basic for much of the work on teacher knowledge which follows.

Shulman's work on teacher knowledge

Historically, teacher knowledge is centered on 'content knowledge'. Shulman (1986) explains what teacher knowledge is and its importance for good teaching in the following statement:

Teachers need to master two types of knowledge; (a) content, also known as 'deep' knowledge of the subject itself, and (b) knowledge of a curricular development. (Shulman, 1986, p.1)

Fouad and Saouma (1997) describe Shulman's view on content knowledge:

Shulman defines content knowledge as knowledge of the substantive and syntactic structures of a discipline. Substantive knowledge refers to knowledge of the global structures or principles of conceptual organisation of discipline facts, concepts, and principles ... (and) the relationships between these. (p.1)

Shulman's syntactic knowledge is knowledge of the historical and philosophical principles of inquiry and values within the teaching field, by which teacher knowledge is organised and reorganised (Fouad & Saouma, 1997). So according to Shulman (1986), syntactic knowledge is related to gaining an understanding of the nature of scientific knowledge:

The most regularly taught topics in one's subject area as well as how those topics are represented such as "analogies, illustrations, examples, explanations, and demonstrations". (p.10)

However, according to Ball and McDiarmid (1990), teacher knowledge has moved its focus primarily to pedagogy. Ball and McDiarmid (1990) state that research on pedagogy has focused on the application of general pedagogical practice in the classroom, isolated from any relevant subject matter. However, several researchers rekindled the discussion about the importance of content knowledge in learning to teach. As Ho and Toh (2000) point out, content knowledge as well as pedagogical knowledge is important: "teaching is about knowing, not just knowing about content and the teaching of content, but also about self and how to know and how to use this knowledge" (p.1).

Shulman's 'knowledge based' model

As one of the key researchers in the teacher knowledge field, Shulman (1986) identified teachers' understanding and relationships between teachers' understanding and their instructions in teaching. Stephen (1998, cited in Kudaligama, 2001) points out this as follows:

In his studies on teacher knowledge Shulman (1986) identified a missing paradigm in research on teaching, namely: *teachers' cognitive understanding of subject matter and the relationships between such understanding and the instruction teachers provide for students.* (p.25). To help fill this void, Shulman (1987) proposed a model of pedagogical reasoning and action. This model has two components: a process component, which described distinct phases or cycles in pedagogical reasoning and action, and a logical component, which included seven categories of knowledge. (p.1)

This model of 'pedagogical reasoning and action' describes the knowledge base of teaching and the process of pedagogical reasoning and action. Gudmundsdottir (1991) further describes this model as follows: "The knowledge base includes the different ways of knowing that are important for teachers and necessary for successful practice". (p. 44)

When summarising the research on teacher knowledge Shulman (1987) points to seven categories of teacher knowledge. These seven categories are: knowledge of content; general pedagogical knowledge; knowledge of curriculum and pedagogical content; knowledge of learners and their characteristics; knowledge of educational contexts and educational ends, purposes, value; and philosophical knowledge, as well as knowledge of historical grounds. These constituents of teacher knowledge are what Shulman (1987), calls the categories of *the teacher knowledge base*.

However, Gudmundsdottir (1991) points out that:

Two categories in Shulman's representation of teaching are central: pedagogical content knowledge and the beliefs and values teachers' hold and their expression in the goals and aims that guide practice. Pedagogical content knowledge is described as a

“special amalgam of pedagogy and content (p.8). Although it seems logical in theoretical considerations to separate values and pedagogical content knowledge, in reality these two are closely integrated. (p. 44)

Within Shulman’s seven knowledge constituents, therefore, pedagogical content knowledge (PCK) has been of particular interest to teacher knowledge researchers. PCK combines subject matter knowledge, pedagogical knowledge and knowledge of context, and was established as a “set of special attributes that helped someone transfer the knowledge of content to another” (Veal & Makinster, 1999, p. 2). This development is described in Shulman’s (1987) statement:

The key to distinguishing the knowledge base of teaching lies at the intersection of content and pedagogy, in the capacity of a teacher to transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students. (p.15)

According to Shulman (1986; 1987; 1992) the concept of PCK refers also to teachers' interpretation and transformation of subject matter knowledge in the context of facilitating student learning. Penso (2000) points to PCK as comprising two main factors: knowledge of the main subject of the discipline in their teaching context and knowledge of the learner and learning process. Penso (2000) provides the following questions to help identify what is important in relation to the main subject discipline in a teaching context:

What are the concepts and skills to be taught? How to organise and present the contents as a meaningful sequence? Which forms of representation such as explanations, examples, demonstrations, analogies and metaphors should be provided in order to promote the students’ understanding. (p.1)

And for knowledge of the learners and the learning process:

What learning difficulties can be expected in the course of the teaching of a certain subject? What are the conceptions and misconceptions ...prevalent among the pupils of various age groups and a diverse cultural background? How do all these factors relate to the methods of instruction to be used by the teacher. (p. 2)

According to Cochran (1997) PCK is therefore a type of knowledge unique to teachers, a perspective that contains a new, broader view of teaching and learning:

...teachers relate their pedagogical knowledge (what they know about teaching) to their subject matter knowledge (what they know about what they teach). It is the integration or the synthesis of teachers' pedagogical knowledge and their subject matter that comprises pedagogical content knowledge. (p. 3)

Science and Mathematics Teachers' knowledge

Anderson (1987) sees the content knowledge of science as having three main components: structure, function and development, with structure being the interwoven relationship of scientific facts, concepts and procedures that allows teachers to integrate and organise their knowledge, as a result of which students can understand the empirical and holistic character of science. Function relates to the social and personal activities that scientific knowledge prepares the individual to do. It is with such knowledge that a teacher can relate science to the every day life activities and experiences of students, and make science relevant to them. Anderson (1987) argues that scientific knowledge is "intimately linked to the tentative, probabilistic, unique, replicable, humanistic, and historic nature of science" (p. 2).

In relation to science teaching, pedagogical knowledge is a form of knowledge that makes science teachers rather than scientists (Gudmundsdottir, 1987). Gudmundsdottir (1987) asserts that an experienced teacher's knowledge of science is organised from 'teaching', which is also used as a basis for helping students understand specific concepts. A scientist's knowledge is learned from a 'research' perspective, which is used to develop new knowledge in the field.

Regarding mathematics, Shulman (1986) stated that pedagogical knowledge goes beyond knowledge of subject matter to the dimension of subject matter knowledge *for teaching*. The American National Council of Teaching Mathematics (NCTM, 1997) claims that "mathematics pedagogy is focused on the ways in which teachers help their students come to understand and be able to do and use mathematics" (p.151). The American *Professional Standards for Teaching Mathematics* identifies five components of teachers' pedagogical knowledge that are important for effective teaching: (1) knowledge of instructional materials and resources; (2) knowledge of ways to represent mathematical concepts and procedures; (3) knowledge of instructional strategies and classroom organisational models; (4) knowledge of ways to promote discourse and foster a sense of mathematical community; and (5) knowledge of the means for assessing student understanding.

According to Anderson (1987, cited in Fouad & Saouma, 1997), Shulman's (1987) PCK "provides answers regarding what prospective teachers need to know (the knowledge base) and how to use that knowledge (the teaching cycle)" (Fouad & Saouma, 1997, p.3). Shulman's 'knowledge base' gives a clear picture of what teachers need to know about good teaching. Illustrating this, Veal and Makinster (1999) state that when teachers use their knowledge to teach they need several activities which help them transfer their knowledge to their pupils. Shulman's 'teaching cycle' demonstrates these activities in detail.

Shulman's 'Teaching Cycle'

Shulman's model of 'Pedagogical Reasoning and Action' was developed in 1987 and refined in later publications (e.g. 1992). It comprises "a cycle of several activities that a teacher should complete for good teaching" (Shulman, 1992, p.17). This cycle of activities or processes was labeled a 'teaching cycle', and includes the following activities: comprehension, transformation, instruction, evaluation, reflection, and new comprehension.

Comprehension refers to teachers' understanding of what and why they teach. Teachers need particularly to understand their purpose in teaching. For Shulman (1992) the purposes of schooling include: students' becoming literate; enjoying their learning experiences; becoming caring people; developing social understanding skills and values (In Time, 2000). According to this, to teach with understanding means to create a few central goals that are important to students and teachers.

The second activity in the teaching cycle model is *transformation*. As pointed out earlier, Shulman's (1992) model shows that "the key to distinguishing the knowledge base of teaching lies at the intersection of content and pedagogy in the teacher's capacity to transform content knowledge into forms which are pedagogically powerful and yet adaptive to the variety of students' abilities and backgrounds" (In Time, 2000, p. 1).

The third activity, *instruction* comprises "the variety of teaching acts" (In Time, 2000, p.1) such as management, presentations, interactions, organising group work, questioning and so on.

The fourth activity is *evaluation* where the teacher uses testing and evaluation of students' understanding as well as self-evaluation. Teachers need to think about testing and evaluation as broad instructions; evaluation includes checking for understanding and misunderstanding during instructive teaching as well as testing for understanding at the end of the lesson. In addition, this

process involves evaluating one's own performance and adjusting it for different situations.

The next activity, *reflection* requires teachers to review and be critical in analysing their own teaching in order to identify where they need to change to become more effective teachers. This process includes reviewing, re-enacting, and critically analysing one's own teaching abilities and then grouping these reflected explanations into evidence for changes that need to be made to become more effective.

Finally, *new comprehensions* refer to the teacher's achievement of new understanding of teaching and their students through the act of teaching. Through acts of teaching that are reasoned and reasonable, teachers themselves achieve *new comprehension* concerning the educational purpose, the subject taught, the students, and the processes of pedagogy (Shulman, 1987). Once teachers comprehend the inter-related nature of the ideas within their discipline and transform them into forms that are attainable, they can then relate their methods directly to their content knowledge and personal understanding of the subject matter. A firm grasp of the subject matter allows evaluation of and reflection on these activities or components.

According to Shulman's (1992) model this is what a teacher does when they look at the teaching and learning that has taken place, as it reconstructs re-enacts and recaptures the events, the emotions, and the accomplishments. In addition, Shulman's (1987) model of 'Pedagogical Reasoning and Action' identifies the role of values in teacher knowledge. Teaching is saturated with explicit and implicit values. As Gudmundsdottir (1991) points out:

We cannot construct meaning without some kind of structured knowledge, and that structure is bound together with values. When future teachers study the subject matter they will later teach to high school students, they are not just learning facts; they are acquiring a worldview imbued with values. (p. 45)

Teacher knowledge as personal and context specific

Theorising about teacher knowledge has continued to develop. Some writers have built directly on Shulman's work and others have taken new directions (e.g. Kettle & Sellars, 1993; Loughran et al., 2001; Anderson, Stefen & Brown, 2002). In particular writers such as Wood (1990), Clark (1995), Ho and Toh (2000), and Zanting, et al. (2003) have pointed to the specificity of teacher knowledge and its dependence on context. In this context researchers also argue that teacher knowledge is not formally fixed and structured, but is personal and context rich. Zanting, et al. (2003) for example use the term 'practical knowledge, to refer to:

an amalgam of all teachers' cognitions, such as...procedural knowledge, and beliefs and values that influence their pre active, interactive and post active teaching activities. (p.199)

They discuss practical knowledge as personal, unique, often tacit, organised and intertwined, with teaching actions. Kettle and Sellars (1993) argue that personal practical knowledge about teaching comes from highly individualistic personal constructs, developed from the teacher's practices. Thus, "it is the teacher's interpretation of their experiences that results in their unique construction of practical teaching knowledge" (p.192). Yet, according to Wideen, Mayer-Smith and Moor (1996), the teacher must first have 'professional' or 'formal knowledge' on which to base their practice. They argue that these beliefs "are not fixed or invariant among teachers because what counts as good teaching will vary among teachers and so to therefore will what counts as professional knowledge" (p. 192)

Professional knowledge has been described by Wood (2000) as a component of teacher knowledge upon which teaching decisions are based:

the experienced teacher has some generalised model of classroom situations, representing what is common to all classroom

contexts... This model enables the teacher to interpret the nature of the problem described by the trainee and to advise accordingly. It is this which constitutes an important part of their professional knowledge. (p.398)

Fenstermacher (1994) distinguishes between 'formal' knowledge of teaching and 'practical' knowledge of teaching. Formal knowledge of teaching from this perspective, is knowledge generated by researchers, and practical knowledge is knowledge generated by the teacher through their classroom experience. This latter knowledge is seen as unique and individual. This argument is supported by Zanting, et al. (2003), who points out that teachers' practical knowledge is personal, unique, tacit, and informs with their teaching practice, as mentioned earlier.

Correspondingly, as Ho and Toh (2000, p.2) point out, a teacher's practice is not just an expression of professional knowledge; it is "shaped by personal attitudes, beliefs and goals" (p.2). Teachers' practical knowledge comes into play and guides their work and decision-making. Ho and Toh (2000) study findings support Shulman's work, as Kudaligama (2001) highlights:

Shulman's (1987) model of pedagogical reasoning and action begins with a teacher's comprehension of subject matter structures and general purposes of schooling and through a series of transformations involving selections of curriculum, representations of subject content, and pedagogical style arrives at acts of instruction. (p.90)

So, in general, "good teaching is when teachers are more than professional managers and wise decision-makers; they are practical scholars and a life long learner of subject matter and of ways to represent it" (Clark, 1995, pp.13-14). This new and broader view of teacher knowledge has been summed up by Wideen et al. (1998 cited in Anderson et al., 2002) as:

a general, global concept encompassing all knowledge, information and ideas that are brought to the act and practice of teaching (and) that this knowledge is complex, situational specific and individually unique. (p.2)

According to Anderson et al. (2002), if “teacher knowledge is tacit, experimental, intuitive and situated knowledge as opposed to formal, explicit, analytic and structurally systematic knowledge” (p .2), then more holistic approaches like narrative and reflective case studies (Anderson, et al, 2002) are required for its study:

This contrasts to earlier research approaches that were of a more positivistic character and more analytic in their decomposition of knowledge of teaching and teacher knowledge into constituent parts. (p.2)

An example of this approach is a study by Knoener-Ekstrand (2002) who investigated how student teachers in Secondary Social Studies constructed and reconstructed their practical knowledge about teaching. Knoener-Ekstrand (2002) placed special emphasis on addressing the gap between school-based experiences within teacher preparation programs and outside resources, and influences like family background, prior schooling experiences and personal values, including their political and educational philosophies. Knoener-Ekstrand (2002) argues that the traditional model for student teaching is fundamentally flawed because it:

assumes that university based course studies the necessary content knowledge and theoretical pedagogical knowledge for teaching and the student teaching field placement provides a context in which pre service teachers can practice applying that knowledge. (p.5)

The big picture of what is involved in effective teaching needs to consider factors that influence the student teachers' practical experiences. These include their family background, values framework and prior experiences and knowledge as well as the ideas and concepts presented to them in the college courses. Using Hawkins's triangular model, Kroener-Ekstrand (2002) explains the factors which affect the development of student teachers' practical knowledge.

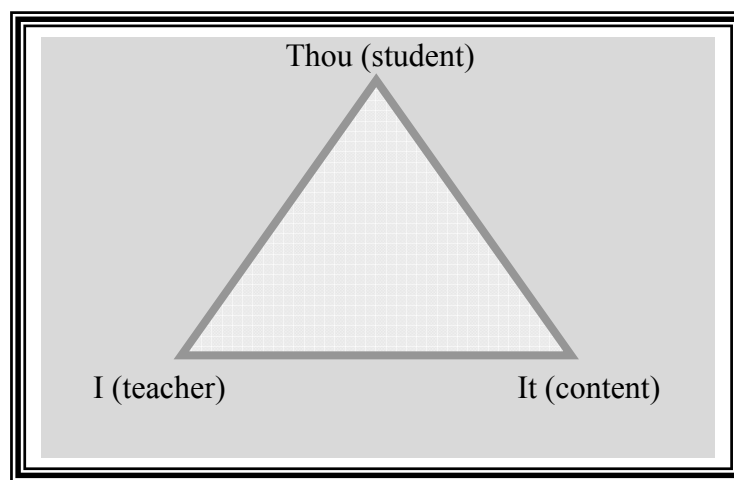


Figure 2.3. Hawkins I, Thou, It Triangle model

Hawkin's (1974, cited in Kroener-Ekstrand, 2002) triangular model suggests that student teachers' teaching-learning relationships are always tripartite: *I* represents the teacher, the student is *Thou*, and *It* is the subject matter to be taught. Armento (1996, cited in Kroener-Ekstrand, 2002) extends Hawkins's model so that the triangle becomes a pyramid with four sides: 1) The course work phase of the initial education; 2) the student teaching phase; 3) the leadership phase of the teacher's career; and 4) the teacher educator phase of the teacher's career. Kroener-Ekstrand (2002) adapts Armento's (1996) framework so that the first two phases are conducted concurrently so that the "*I*" point of the triangle now represents the methods instructor, university supervisor, co-operating teachers and cohort peers. "*It*" now represents

professional knowledge about teaching methods as well as practical knowledge about teaching methods. This Kroener-Ekstrand (2002) study shows how student teachers construct their knowledge and identifies influences on their knowledge constructions.

Knowledge organisation and organisational changes

This section provides a discussion of the literature concerned with how student teachers organise and change their pedagogical knowledge during their preparation period. It also discusses the influence of teacher preparation programs on the development of student teachers' knowledge construction.

A study which gave particular emphasis and direction to this research was one conducted by Jones and Vesilind (1994) which use concept mapping and interviews to investigate the changes in the structure of the pedagogical knowledge of middle school pre-service teachers during the last year of their undergraduate program. Unlike the study reported in this thesis the Jones and Vesilind study used multi-disciplinary scaling to identify these changes. The student teachers (participants) in Jones and Vesilind's study drew four concept maps during the last year of their undergraduate program which included a teaching methodology course and student teaching. The four maps were drawn before they began their senior year, in the middle of student teaching and at the end of student teaching. Before each new map the previous maps, drawn by the student teachers were returned for them to decide whether they would organise their knowledge differently. After they drew their maps, the student teachers were interviewed. The student teachers also participated in card sorting tasks after the second, third and fourth interview. Jones and Vesilind (1994) coded the maps and scored them according to the number of examples (concepts), relationships, hierarchies, and cross-links, with the sample concepts of '*flexibility*' and '*planning*' subjected to further analyses using multidimensional scaling and student teacher interviews (Jones and Vesilind, 1994).

Jones and Vesilind's (1994) research questions were: how do student teachers' concepts of effective teaching change over time? Do student teachers perceive changes in the organisation of their concepts and, do changes in the organisation of concepts represent accretion (growth by addition) or a radical reconstruction of knowledge? Their results showed a sharp increase in the number of cross-links and concepts in the student teachers' third maps, which were drawn in the middle of their student teaching period (Jones and Vesilind, 1994). The number of concepts or examples decreased during the middle and end of the student teaching period which was explained as a 'narrowing down' to the most important concepts. Overall, Jones and Vesilind's (1994) results showed a radical reconstruction of pre-service teachers' pedagogical knowledge during the study.

The radical changes in the reorganisation of student teachers' pedagogical knowledge in Jones and Vesilind's (1994) study mainly involved a reorganisation of their prior knowledge, theories, and beliefs. Jones and Vesilind (1994) argue that the radical reorganisation of prior knowledge was evidenced by major changes to organisational concepts for effective teaching during the midpoint of the student teaching period. Changes in organisational concepts opened up new possibilities for adding cross-links among the hierarchies.

On the basis of their study, Jones and Vesilind (1994) concluded that the pre-service student teaching experience "can be enriched by supplementing classroom teaching with other forms of professional experiences in which the student teachers can interact with more experienced teachers" (p.8). They found that by providing student teachers with strategies and opportunities for reflection, they could continue to reorganise their concepts about teaching as they gained more experience (Jones and Vesilind, 1994).

In another relevant study of how student teachers change their personal theories over the time of their preparation courses, Sendan and Roberts (1998) showed that while the content of student teachers' personal theories did not change much over time, their structure changed noticeably. By 'personal theories', these authors meant "an underlying system of constructs that student teachers draw upon in thinking about, evaluating, classifying and guiding pedagogic practice" (p.230). These authors concluded that student teachers' personal theories are usually open to change if they can be put to the test. The basis of this claim is that the researchers' data suggested that "their (student teachers) personal theories are idiosyncratic, complex in nature, and open to change if they are re-examined" (p. 240). Also, "initial training can be more powerful after taking into account the structural development taking place within their thinking" (pp. 240-241). Moreover, their cognitive development should not be seen as a simple process of aggregation of new ideas, because in the professional development process, new information and new experiences were found to lead them to "add to, reflect upon and restructure their ideas in a progressive, complex and non-linear way" (p. 241).

How student teachers reflect on their experiences in learning to teach has been evaluated by Kwo (1996). The study found that experience is not the same as expertise. The Schema differences between expert and novice teachers were associated via their prior knowledge, awareness of classroom events, their production of learning misconceptions, and concepts and routines. Kwo suggests that:

While it is reasonable to see teachers' schemata as developing with experience, experience should not be equated with expertise. Amongst the important questions is how novices develop their schemata during initial teacher education. (p.273)

According to Kwo (1996), it is very important to determine how novice teachers develop their schemata during their preparation, because earlier teaching experience is significant for various aspects of their reflective

classroom practice (Kwo, 1996). The findings show that student teachers without previous teaching experience did not enter the learning process with the same developed teaching schemata as their experienced peers and did not have some important entry perspectives about teaching. As a result, Kwo (1996) promotes reflective teaching to develop individual teaching:

the findings indicate the ways student teachers responded to their course experiences. The extent to which the objectives were achieved were partly revealed in student teachers' own words; their own assessment of their learning experiences, and how they concluded their own understanding of the nature of teaching...by nurturing individual development through promoting reflective teaching. (p.295)

According to Holt-Reynolds (2000), teacher education coursework is increasingly using constructivist pedagogies which perceive knowledge as created rather than received. Rather than the teachers transferring knowledge as a uniform set of positive ideas, the student's existing knowledge is used as the basis for constructing meaning and understanding. Holt-Reynolds (2000) uses the case study of a student teacher called *Taylor* to argue that while constructivist pedagogies are seen as techniques for thinking with students and mediating their discourse, a commitment to constructivism might also be a means for teachers to avoid admitting their "perceived personal inability as a knower" (p.29).

Taylor's case warns me that for some prospective literature teachers apparent commitment to constructivist pedagogies may be nothing more than a means for avoiding a confrontation with perceived personal inability as a knower... Therefore, Taylor's case reminds me of the importance of the teacher education knowledge base. Prospective teachers need to understand the

theoretical underpinnings of the practical, useful teaching strategies we are eager to see them adopt. (p. 29)

Holt-Reynolds (2000) goes on to say that “rather than understanding constructivist pedagogies as techniques for thinking with learners, Taylor saw that for teaching them these strategies are an end in themselves” (p. 30). The conclusion drawn from Taylor’s case study was that the teacher education knowledge base is still important, therefore student teachers “need to understand the theoretical underpinnings of the practical, useful teaching strategies we are eager to see them adopt” (p. 30). However, Holt-Reynolds (2000) argues that student teachers may disregard theoretical knowledge “in their impatience to generate an environment for their students to construct or reconstruct their meaning and understanding of what constitutes effective teaching” (p. 30).

Tillema (1998) conducted a study to explore the stability of student teachers’ beliefs in effective teaching. She studied 124 student teachers at three different institutions for six weeks during their first year of study. Their beliefs were measured with a *‘teaching belief’* test designed to detect specific ideas about teaching and learning. The test was given to the students before and after the six-week course. The results showed that the six-week program did change their thinking but not in the manner expected. That is, while 72 percent did change their thinking, these changes were not in one direction. Beliefs and conceptions gained before pre-service teacher programs often remained stable and largely unchanged, Tillema concluded that:

New information and knowledge presented to student teachers in the context of programs for teacher education need to relate to these conceptions in order to be accepted, integrated and activated in the behavioural repertoire and practice of student teachers. (p.217)

It appears that new information can be discarded and not absorbed if programs in student teacher education do not provide adequate opportunities for reflective exchanges and consideration of these matters from the teacher educator.

Tillema (1998) interpreted the results of this study in the light of Chinn and Brewer's (1993) 'belief change model' which views the belief change process as: a coherence check, discrepancy recognition, the need for reconstruction, and searching for solutions. Using this model it was found that student teachers' beliefs about teaching and learning are gradually constructed, then modified and rearranged over time. Therefore, their thinking and reflection needs to be encouraged and monitored so that their acquired beliefs do not cause them to reject new knowledge. Tillema (1998) concluded that once the processes involved in belief change are recognised then "challenging student teachers' beliefs and stimulating them to learn becomes possible" (p.226). She suggests that:

Dealing with existing beliefs of student teachers in the context of teacher education courses requires a conceptual framework for interpreting the importance and action usefulness of their thinking in the light of the newly presented information. (p.226)

Teachers' beliefs and practices were also investigated by Archer (2000), who looked at the differences in teaching strategies between primary and secondary teachers. Archer (2000) found little evidence that teachers' beliefs or practices were the result of professional preparation courses, although some primary teachers did indicate that "their practices resulted from following syllabus guidelines" (p.6).

In conclusion, there are numerous studies (Jones and Vesilind 1996, Kwo 1996, Sendan and Roberts 1998, Tillema 1998, Archer 2000, Holt-Reynolds

2000, and Neol 2000) that have clearly shown how pre-service teachers' knowledge changes and develop during their preparation programs.

Knowledge organisation and concept mapping

This section contains a discussion of concept mapping as a suitable method for addressing student teachers' knowledge construction and concludes with a discussion of studies which use the concept mapping strategy to examine how they construct and change their knowledge during their preparation courses.

Trowbridge and Wandersee (1994) describe concept mapping as particularly useful for constructivist teachers and researchers who seek insights into how individuals construct their idiosyncratic concepts. Cary (1986) suggests "by comparing successive concept maps produced as the student gains mastery of the domain, the researcher can see how knowledge is restructured in the course of acquisition" (p. 1126).

Concept mapping is a tool that has been successfully used in education for a number of years to examine the way individuals organise their knowledge (Novak & Gowin, 1984; Teylor, 1993). According to Novak (1987), a concept map is a general method that can be used by an individual or group to describe their ideas pictorially, help them to think more effectively, and manage their ideas without trivialising or losing detail. Fraser (1996) also points out that concept mapping is a technique used extensively in the educational field over the past twenty-five years, and it has now been extended into the non-educational setting. Uses of concept maps rest on the assumption that the learner is the centre of knowledge construction. Learning occurs when people retain a concept by relating it to what they know, thereby making sense of it (Ausubel, 1998; Fraser, 1996). Learners reorganise connections between concepts, salient relationships and place interesting new information into existing knowledge (Fraser, 1996).

The concept map is a technique which allows people to visually represent the connection between concepts in their cognitive structures, and to explain the nature of these relationships through phrases and words on the links between concepts. As Fraser (1996) points out “in the process of connecting the concepts people are in a position to modify their current understanding by either integrating new concepts or rearranging existing concepts. They are in the position to use this map to communicate their understanding to others” (p.2). This latter use of concept maps “to communicate their understanding to others” is how concepts maps are primarily used in this thesis.

Jonnassen (1997b) claims that concept mapping can be used as a cognitive tool that enhances the cognitive powers of a person such as thinking, problem solving, and learning. Concept mapping is also an efficient tool for reflecting upon what learners know. For example, Ferry, Hedberg and Harper (1997), showed how student teachers used concept mapping to construct their curriculum-content knowledge in more powerful integrated patterns, and how constructing concept maps extended pre-service teachers’ planning and instruction skills. They found that the process of concept map construction promoted these skills.

Chastonay, Papart, Laporte, Lagoutte and Praplan (1999) used concept mapping to define learning objectives in a Masters program in the public health field. Concept mapping was consistently used to identify the learning goals of students involved in planning, implementing, and evaluating research projects. Chastonay et al. (1999) found that this technique was a meaningful and effective tool for the students, because it improved their interdisciplinary approach to problem solving and helped them to interact and share their ideas with the teaching staff. Chastonay et al. (1999) state that substantial evidence exists to confirm the view that concept mapping facilitates meaningful learning and increases a learners’ ability to “relate new concepts to previously acquired knowledge and know how with more autonomy” (p.3).

Overall, the concept map has often been demonstrated to be a powerful instrument with which to explore the way student teachers organise and reorganise their knowledge of teaching. In this particular research concept map was used to identify student teachers understanding about teaching as it changed through their student teaching period. The concept maps data also provide a stimulator for the student teachers' interview data.

Summary of the chapter

This chapter has examined literature that has informed this research study on how teacher preparation and education programs help student teachers construct their knowledge of teaching, how adequate they are and what strategies can be used to develop them further. It appears that teacher understanding of their knowledge, their ability to transform it into pedagogical knowledge, as well as instruction, evaluation and reflection practices will often determine how student teachers organise their knowledge of teaching to become effective teachers. Further, this chapter also discussed the concept of teacher knowledge as described by Shulman and more recent writers including Clark (1995), Wood (2000) and Ho and Toh (2000). Finally, the chapter discussed concept mapping as an approach for assessing student teachers' knowledge construction. The next chapter will discuss the methodology of this study.

Chapter Three

Methodology

Introduction

Chapter Three presents details about how this research study was developed and implemented. It describes the research design adopted, including the research setting, the participants and the procedure. This chapter also describes the ‘concept map’, which is the main instrument chosen for gathering data. The analysis procedures applied are discussed, as well as the validity and reliability data of the study, including the limitations. This discussion is organised under the following sub-headings.

- Research design
 - Concept map as a research technique
- Research setting
- Participants
- Gaining access to participants and ethical considerations
- Procedures
- Presenting data
 - Case studies
- Analysing data
 - Concept map data
 - Interview data
- Validity and reliability
- Limitations
- Summary

Research design

A qualitative research approach was used in this study to gain a broader understanding of how pre-service teachers organise their knowledge about teaching during the student teaching period in their teaching diploma course. Strauss and Corbin (1998) describe qualitative research as: “any type of research that produces findings not arrived at by statistical procedures or other form of quantifications” (p.11).

This study focuses on how student teachers made meaning of their teaching experience and how their understanding of teaching changed over the duration of their student teaching period. This study therefore, uses an analysis of textual data derived from interviews and from participants' drawings of concept maps.

Concept mapping as a research technique

As Novak and Gowin (1984, cited in field Tested Learning Assessment Guide, National Science Education Standards, 1998) state, a concept map is a two dimensional diagram that contains concepts and directional named links. Concepts can be events, things that happen, objects or any thing that exists and can be observed. In concept maps, concepts are unified by relationship lines, which indicate how the relationships between the concepts are seen and understand. According to Novak (1985) concept map can also help students think more effectively about a specific topic, and manage the complexity of their ideas without trivialising them or losing detail.

The following figure provides an example of the way in which a concept map can be constructed, using notions of levels and relationships (links).

Figure 3.1. Structure of the concept map (From Novak & Gowin, 1984)

For this study, Level 1 ‘general concepts’ were identified as the ‘main organisational concepts’, because other sub concepts were organised under these concepts.

According to Novak (1985), the core element of a concept map is a *proposition*, where the relationship between two concepts is connected by a *labelled link*. When all these propositions are connected to each other the hierarchical, branching structure formed represents the organisation of knowledge in memory (Novak, 1985). These ideas, which are known as schemas, are organised as networks of related ideas called semantic networks. *Semantic networks* are special representations of concepts and their interrelationships that are intended to reveal their organisational structures of knowledge (Novak & Gowin, 1984). This structure provides the researcher with a useful and visually appealing way of exploring the participants’ cognitive structures or schemas of long-term conceptual knowledge, which can be compared to subsequent maps and interview data to reveal how, in the case of this study, student teachers organise and reorganise their knowledge about teaching. In relation to this study, information was gained from the concept

maps participants (student teachers) developed at different stages of their student teaching, and from the interviews with the participants about their maps which followed.

It was assumed that the student teachers' knowledge about teaching would change over time according to the new knowledge gained from the student experience in the classroom and that these changes would be recognisable in the participants' concept maps drawn at different times during the student teaching. The concept map technique is thus used here to provide pictorial maps to represent changes in the student teachers' understanding about teaching.

Concept maps have been used for over twenty-five years in the educational field (Novak & Gowin, 1984; Jones & Vesilind, 1994; Jonnassen, 1997a). They are becoming increasingly popular as a useful tool for student teachers' knowledge representation (Novak, 1987). Zeilik (2003) for example, has used concept maps to assess student teachers' knowledge about a specific topic. Their knowledge was represented as graphics or diagrams using nodes that contained concept labels that were linked together with labels and directional lines (Zeilik, 2003). The concept map can thus indicate student teachers' knowledge about a specific topic as networks of ideas in a graphical form. Other researchers (Morine-Dershirmer, 1993; Winitzky & Kelly, 1994; Winitzky & Kauchak, 1995) used concept maps to trace long-term changes in participants' cognitive structures. In another example, Park (1995) used concept mapping to enable teacher educators to assess student teachers' knowledge organisation at various points in their training. Park (1995) also examined whether concept-mapping assessment reflects expected differences and changes in student teachers' conceptual frameworks.

The strength and power of the concept map rest on the assumptions of many researchers and psychologists that concepts are ultimately understood through

their relations with other concepts, and that concept maps can be used for assessing conceptual change (Bridge & Wandersee, 1988; Novak & Musanda 1991). How this works is represented in figure 3.2 which also provides an explanation of how concept maps are constructed.

Figure 3. 2. Concept map for concept maps

(Ref: Field tested learning assessment guide, 2000, p.5)

In summary, many studies have shown that concept mapping is a powerful and psychometrically sound method for assessing conceptual change (Bridge & Wandersee, 1988; Novak & Musanda, 1991). As mentioned in chapter two, a number of studies used concept mapping to assess student teachers' conceptual changes during their training period. The studies used both qualitative and quantitative analysis to show students conceptual changes, however, this particular study predominantly used qualitative analysis. It use concept maps as a tool to represent student teachers' understanding about teaching and to provide a guide to how these have changed over their student teaching period.

However, Novak and Gowin (1984) suggest that knowledge representation is far more complex and dynamic than can be demonstrated by concept mapping alone, therefore, concept mapping assessment can be better enhanced with other strategies such as interviews. For example, Jones and Vesilind (1994) used structured interviews as well as card sorting tasks with concept mapping when investigating how student teachers organised their pedagogical knowledge during their student teaching period. On this basis, the concept map was considered a useful and suitable tool for this study to enable an understanding of how student teachers organise, change and reorganise their knowledge about what constitutes good teaching. This concept map data was supported by the interview data that was collected after the concept maps were constructed.

Research setting

This study is set within a pre-service teacher education program called the Teaching Diploma course conducted by the National Colleges of Education (NCOEs) in Sri Lanka. This three year course prepares teachers for teaching in secondary schools. These teacher preparation courses have been designed by the National Institute of Education (NIE) in Sri Lanka. The NIE authority is responsible for curriculum development and professional development of teacher education courses in Sri Lanka, and has recently changed the course work and the duration of the practical experiences of teaching diploma courses at NCOEs. All of the participants in this study were involved in the second year of their three year Science and Mathematics teaching diploma courses.

During the first two semesters in the first year of their course the student teachers who participated in this research study completed professional education and general education subjects, including the general and special method subjects. (This course work and subjects are described in detail in chapter 4). These subjects included instruction in teaching methods for two content areas; major and minor subjects*. In addition, in their first year student teachers were required to observe classes at their student teaching placement

sites. They also participated and observed simulated practice teaching lessons in their college.

During their second year at the College the student teachers participated in full-time teaching placements in schools. This placement is known as a 'student teaching' period or 'block teaching' period, and occurs between January and March. This student teaching period consists of twenty days teaching divided with two phases: the first 10 days are from mid January to February, and the second ten days are at the end of March, returning to college for seminars between phases. After completing their student teaching all student teachers return to their College and participating in follow-up reflective seminars. It is during this period from January to March 2003 the data for this study was collected.

Participants

The twelve student teachers who participated in this study were enrolled in Science and Mathematics teaching diploma courses at the National Colleges of Education (NCOEs) in Sri Lanka. The entire body of students (120 student teachers) in those courses were eligible to participate in this study. However, following the advice from college authorities, the researcher finally selected two classes, due to locality and the ability to gain access to the participants. One of the classes was a second year Science class, which had twenty-four students. The other was a second year Mathematics class, which had twenty-

*Major = Mathematics or Science, Minor = Mathematics for Science course or Science for Mathematics course. Each student teacher who enrolled in teaching diploma courses in Sri Lanka selects a major subject area, which they propose to teach. In addition, they are encouraged to follow an additional minor course. For example the student who follows the Mathematics course is likely to select a Science course as a minor, and a student following a Science course selects a Mathematics minor course. Mathematics and Science major and minor course components are different. Minor courses include less course content than major courses. The reason for studying two content areas (major and minor) is to help remedy teacher shortages that schools may have. For example, the Mathematics teacher could cover a Science teacher shortage in the school.

three students. The researcher introduced the topic and nature of the research and invited all of the students to participate in the study. A 'first-come-first-served' method was used to choose twelve participants. It was decided that twelve participants would be required for the study, as this number would provide the suitable depth, as well as being manageable for the size and duration of the study. As participants, Mathematics and Science student teachers were chosen because they were already somewhat familiar with the method being employed (concept mapping). In addition, Mathematics and Science are the areas of the researcher's own teaching background. Six participants were chosen from the Mathematics course and another six from the Science course. The following table shows the characteristics of the 12 participants.

Course		Subject	
Major	Minor	Male	Female
Science	Mathematics	3	3
Mathematics	Science	3	3
		Total 6	Total 6

Table 3.1. Selection of the participants

Gaining access to participants and ethical considerations

According to Glesne and Peshkin (1992), gaining access from the 'gatekeepers' is the preliminary step for implementing the research. Prior to conducting this study, permission was obtained from the Human Ethics Committee of the University of Wollongong (see Appendix1). Consent from the NCOEs authorities was also obtained to conduct the research using their student teachers and their premises (see Appendix 2).

Another crucial preliminary step in a qualitative study is obtaining the informed consent of all participants (Lincoln & Guba, 1985; Glesne & Peshkin, 1992). At the beginning of this study all participants were informed about the purpose of the study, verbally as well as in writing (see Appendix 3 for Information Sheet), and written consent forms were provided to all participants in the study. Participants then, completed a consent form, which indicated their acceptance to take part in the study (see Appendix 4 for Participant Consent Form). Further, by using pseudonyms, the anonymity of the participants has been maintained.

Procedure

In January, 2003, of the second year of their program, prior to beginning their first phase of student teaching, the participants (student teachers) attended a special three-hour seminar during which they received standardised instruction from the researcher on how to draw concept maps using print based materials. (The participants were accustomed to using concept maps for the learning and assessment processes in their class). In this seminar they gained specific instructions on how to draw useful concept maps using concept map principles relevant to the study. Two techniques were introduced to provide an opportunity for participants to select a preferred technique to complete the mapping exercise. The following were the two techniques developed by the researcher with reference to Fraser (1996).

Technique

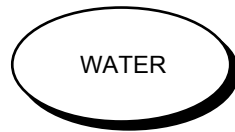
Step 1-Choose a familiar topic and brainstorm to find the concepts related to that topic.

Example: Water

Related concepts: states, molecules, solid, liquid, gas, heat motion

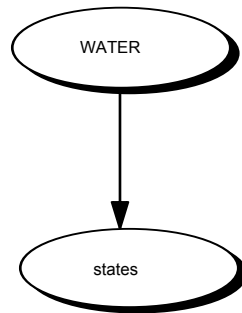
Step 2-At the center of the top of the page, write the name of the topic area.

Example:



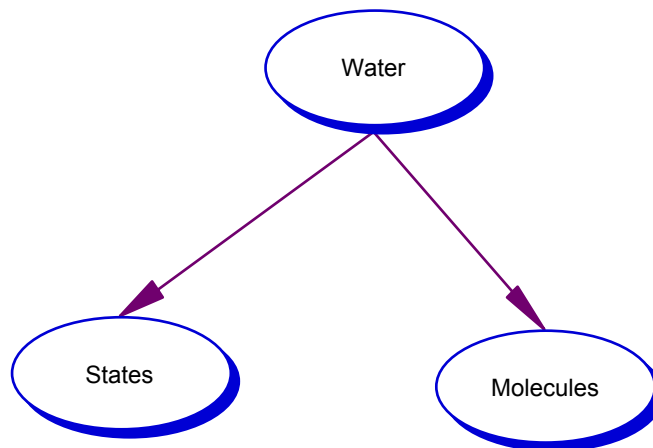
Step 3-Choose one of the major concepts produced by the brainstorming which is related to the topic.

Example:



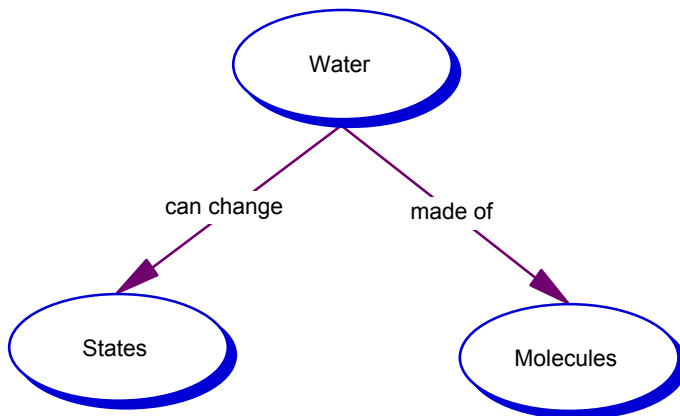
Step 4-Identify other major concepts, and start another branch, as follows:

Example:

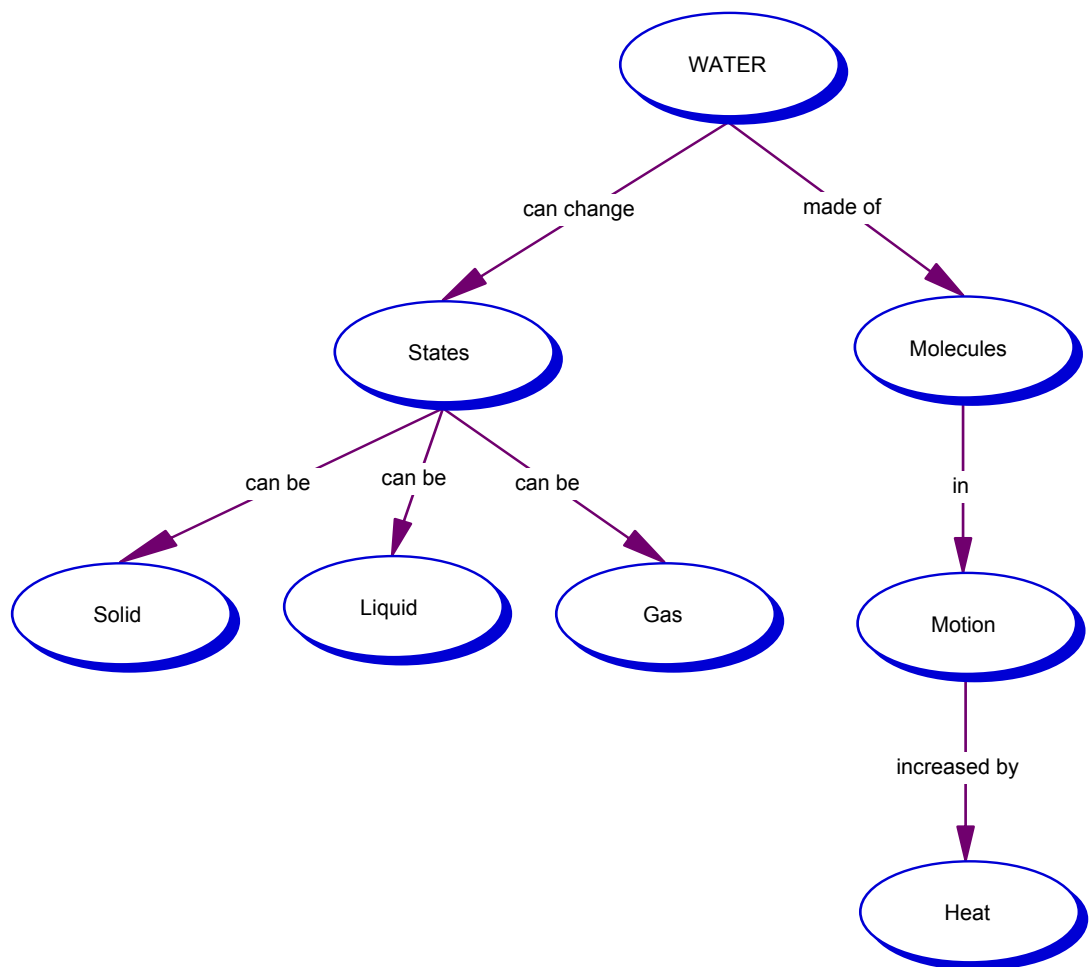


Step 5-Add words that describe the link between the concepts.

Example:



Step 6-Identify all the concepts that are related to each of the branches, for example:



Concept map for ‘water’

Step 7-Reconsider how the hierarchy is developing and rearrange any concepts to ensure the map is clear.

Step 8-Consider whether further meaning can be shown by adding more connections (link words) between concepts.

Step 9-Focus particularly on the concepts at the sides of the map, then on those at the top and bottom in order to ensure the linking words and hierarchies accurately represent your ideas.

Step 10-Now attempt to add more concepts about the topic to your map, reorganising the hierarchy if necessary.

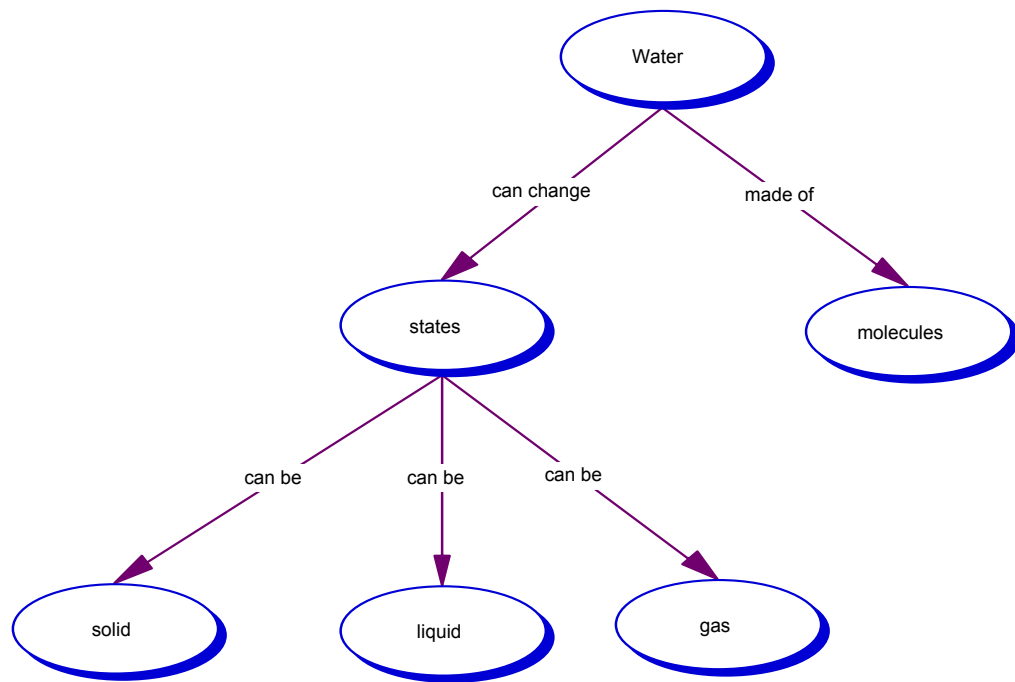
Technique 2

Step 1-Choose a topic that you know well (Example: water).

Step 2-Make a list of all concepts you can think of that are related to the topic (Examples: water, states, gas, liquid, molecules, solid).

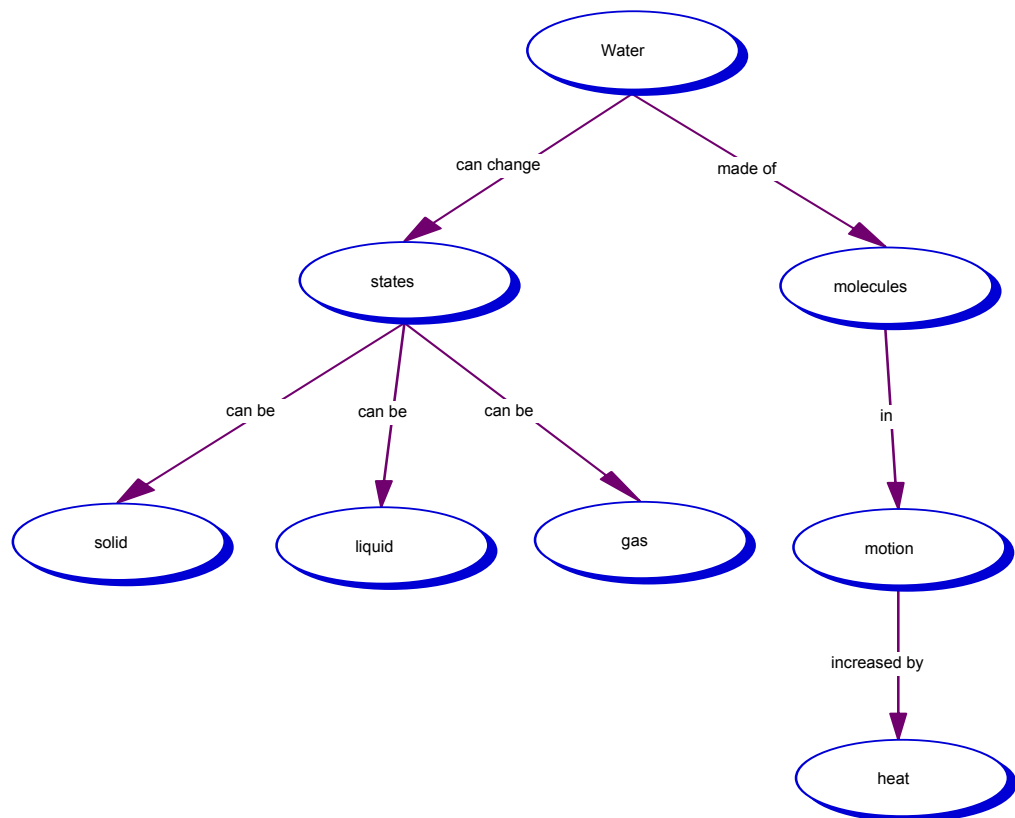
Step 3-Consider the relative importance of each concept and rank them from the most important to the least important (Remember to choose whichever works for you to develop your initial hierarchy) and write it down.
(Examples: water, states, molecules, solid, gas, and liquid).

Step 4-Arrange the concepts into clusters, then draw in and label linking lines.



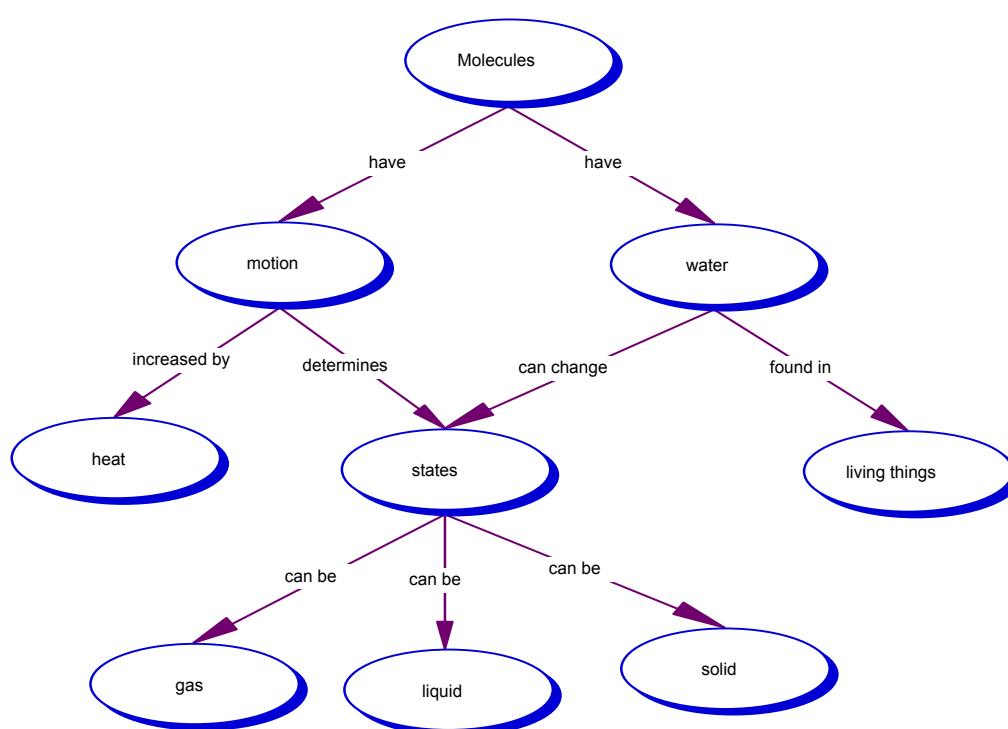
Step 5-Reconsider how the hierarchy is developing and rearrange any concept(s) to ensure the map makes sense to you.

Step 6-Consider whether adding more connections or link words between concepts can show further meaning.



Step 7-Focus particularly on the concepts at the sides of the map, then on those at the top and bottom in order to ensure the linking words and hierarchies accurately reflect your ideas.

Step 8-Now attempt to add more concepts about the topic to your map, reorganising the hierarchy if necessary.



The participants were then instructed to select one technique to draw their concept maps. They drew several practice maps for selected sample topics, and were then asked to draw the first concept map for “*Sarthaka Egenveema*” (the Sinhalese word which can be translated as ‘good teaching’, ‘effective teaching’ or ‘quality teaching’ this map formed the basis of the research study. Participants were asked to use the concepts which they had learned from their course work as well as the concepts related to their own understanding and experiences in drawing their maps.

While the other participants drew their maps each student teacher was interviewed for around half an hour, and notes were taken. Some focus

questions were asked at these interviews which helped collect biographical details, for example: What is your family background? Why did you select this profession as your career? What prior experiences do you have of teaching?

The participants drew three concept maps on separate occasions: one in January, 2003 (before the practicum period); the second in February, 2003, (at the end of the first phase of the practicum); and the third in March, 2003 (at the end of the practicum). For half of the participants (Sharmalie, Piyal, Malanie, Sanjaya and Sarath) in the last two sessions, the previous map (drawn by each participant) was returned. These participants were asked to study their previous map and decide if they would organise their knowledge differently. These participants were selected in the following way. All participants were listed in two groups, Mathematics and Science, and each participant was given a number. The participants who received odd numbers were selected to receive their previous maps. These participants were instructed to draw a new map or modify and redraw the old map, or redraw the old map as it was. For the other half of the group, the previous maps were not returned, and they were asked to draw new maps. The reason for using this strategy was to investigate whether students' previous maps had some effect on their new maps and if the different approaches to map drawing affected the patterns constructed by the participant student teachers.

Most of the participants drew their maps using *Sinhalese* language, and then the researcher translated their maps into English. Some participants drew their concept map using English language, showing their English language ability. The participants originally constructed their maps using pen and paper. However, for ease of interpretation of reproduction for this study the researcher re-constructed those maps on computer using "Inspiration" software. For these translated concept maps, the word 'effective teaching' was used as a translation for '*Sarthaka Egenveema*' as the key concept (see appendix 5A, 5B, and 5C for sample of original concept maps). Following the construction of each map, the participants were interviewed using a structured interview script. The

questions asked in the structured interviews are shown below (see Appendix 6 for original questions in Sinhalese). Prompts were used to elicit further details when necessary.

1. Please explain your concept map.
2. Can you see any concepts in your map that you did not include in your previous map?
3. What are they?
4. Why did you add them in this stage?
5. What factors influenced you to make these changes?
6. Which concepts in your map are you most certain of?
7. Why is that the case?

These interviews were audio recorded and fully transcribed shortly after each interview. Interviews were conducted in the participants' own language (Sinhalese) and then translated into English.

Analysing data

The data gathered from the concept mapping, and interviews, were analysed both separately and together, the difference in the organisation of students' knowledge revealed a cognitive pattern and provided contextually relevant information to help explain choices of concepts and changes from map to map. The following description provide the strategies that used for analyse each data collected by two different tools.

The concept maps data

This study primarily adopted a qualitative analysis, however concept maps can be used both in qualitative and quantitative approaches. This is because of the nature of the research questions in this study and or protocol of the case studies. The qualitative analysis involved coding a number of features of the concept maps: represented hierarchies, cross-links, relationships and examples.

This analysis used procedures described by Novak and Gowin (1984) and Markham, Mintzes and Jones (1994). According to Novak (1985), the two most important features of concept maps are the hierarchical structure and cross-links. In addition, other features that may be created in concept maps are specific examples of events or objects that help to clarify the meaning of a given concept. The sub-categories of concept maps can be described as follows.

Example: Specific object or event that can be present as a valued instance.

Relationships: Connecting lines and linking words between two concepts.

Hierarchy: Connections among concepts, from general to specific.

Cross-links: The connection between an item in one hierarchy and an item in another hierarchy.

According to Novak and Gowin (1984), the levels of the sub-categories represent the complexity and the increase in coherence, which are reflected in the knowledge construction through hierarchies and cross-links. Therefore, represented hierarchies, cross-links, relationships and examples are very important and useful in understanding the thinking of the producer of the map.

It is important to search for changes in the organisational or main concepts to identify the changes in the organisational structure of concept maps. The main or organisational concepts are defined as those connected directly to the title (for this study, the title is '*Sarthaka Egenveema*', (in English *good teaching, quality teaching* or *effective teaching*), and those concepts are placed highest in a hierarchy. This was facilitated by the student teachers having been instructed to construct their maps in a hierarchical format. If the main or organisational concepts are changed whole hierarchies are changed. It indicates the changes in drawers' cognitive structural changes. Therefore, to understand the reorganisation of concept maps, it is necessary to examine the main cluster concepts as well as the changes of such concepts (added and deleted at various levels). The concepts drawn at different levels indicate changes of knowledge occurring over time and through experience. Therefore, each concept map

constructed by the participants was analysed to identify the main or organisational concepts, the number of concepts, the number of levels, and the number of links among the concepts as they were added or deleted at each level from one map to another over the student teaching period. However, of more interest for this project was the qualitative component, that is, 'what' concepts were added, taken away or changed in relation to other concepts.

The interview data

In their interviews, each of the participants described their maps, providing insights into the sources of changes. The interviews also helped to triangulate data from the concept map drawings. The interviews examined how the student teaching and related experience influenced student teacher knowledge organisation. To examine this each student's comments about changes in their maps was coded into a category that represented the source of the changes. The interview data were analysed for each student within and across each time period. They were also analysed across different interview questions.

For this study, as a result of using participants' concept map drawings and their interview data, multiple case studies were developed-one for each student teacher. The concept maps were analysed with the interview data to identify changes in knowledge and to provide contextually relevant information and to help explain choices of concepts and changes from map to map.

Presenting data

Case studies

Case studies have been used in this study, to present participants' data. These case studies built on the data from participants' concept maps, and the interview data which followed with participants' descriptions about their own maps. The case studies include information about the background of the participants describing what the participants bring to the study and about their

concept maps that participants developed at different stages during their student teaching period.

The case studies are an important type of interpretive (ethnographic) research mode for educational researchers (Yin, 1994, p.166). According to Lincoln and Guba (1985) the case study report format is very useful for raising the researcher's understanding, especially for the naturalistic researcher. Lincoln and Guba (1985) believe that raising the level of understanding in a specific field of inquiry is the ultimate purpose of the case study report. While superficial descriptions and statistics can be gained by investigating a multitude of cases, "the case study enables the reader to gain a deeper personal understanding of a topic and to make more naturalistic generalisations" (p. 358).

Validity and Reliability of the data analysed.

To improve the validity and reliability of this study, several strategies were used. Firstly, the concept map method used for this study was trialled in *a brief pilot study* with four student teachers from an Australian context. These student teachers were engaged in the primary teaching diploma course at University of Wollongong. The interview questions were also trialled with them. These student teachers developed concept maps twice during their practicum period, and after drawing their maps they were also interviewed. (*At first, the researcher planned to conduct three concept map drawing sessions and follow-up interviews, however, due to the administration and technical problems, student teachers attended only two map drawing sessions and interviews at the beginning of the practicum and after the practicum*). From these concept maps and following interview data four case studies were developed. (See Appendix 7 for sample interview data and Appendix 8 for sample case study of pilot study). After examination of this strategy in the pilot study, similar methods were used for the final project case studies, and the concept map methodology

was refined and a mode of qualitative interpretation of the concept map developed.

Secondly, in the study the researcher explained clearly to the participants the procedures being used. In interviews with the participants, all interpretations were discussed with those participants and agreed upon with them. Moreover, conclusions reached by the researcher on the basis of the data were always shared with the participants and their suggestions were accepted. All decisions and criticisms were discussed and appropriate suggestions, modifications and adjustments also made. Ultimately consensus was reached in each case.

It is important to note that, according to the constructivist perspective, learning is a process not a product (Von Glasersfeld, 1987; Brooks and Brooks, 1993). It is acknowledged therefore, that the research method of concept mapping could have affected or enhanced student teachers' reflections about teaching, thereby influencing changes in their knowledge organisation.

Limitations

The participants in this study were identified from the National Colleges of Education in Sri Lanka, and the results of this study have to be considered in light of the number of subjects (n=12). The selection of this number of subjects was due to practicality of the research and the need to conduct an in-depth qualitative analysis of three maps for each participant. Another important consideration was the administration of the study and the limited time duration of both the student teaching period and the study. The chosen sample was appropriate to understand pedagogical beliefs and knowledge and changes therein of this group of participants.

The results of this study may not be generalised to other programs because of the unique situation of the case studies, however this study could provide a

reference point for future studies both into the successful individual learning situations specifically, and for the development of teacher education programs generally. Therefore, outcomes of this research would be important in developing both individual student teachers' learning strategies and their teacher preparation program content.

Summary of the chapter

In summary, this chapter has detailed the research methodology including setting, the study sample and procedure and the construction processes of concept mapping. The concept map has been demonstrated to be the most suitable instrument for gathering data for this study of student teachers' knowledge and understanding, and changes therein related to student teaching (practicum) experience, when supported with interview data.

The following diagram shows the steps of the study and its timeline. The data and the analysis of the data will then be presented in the following chapters.

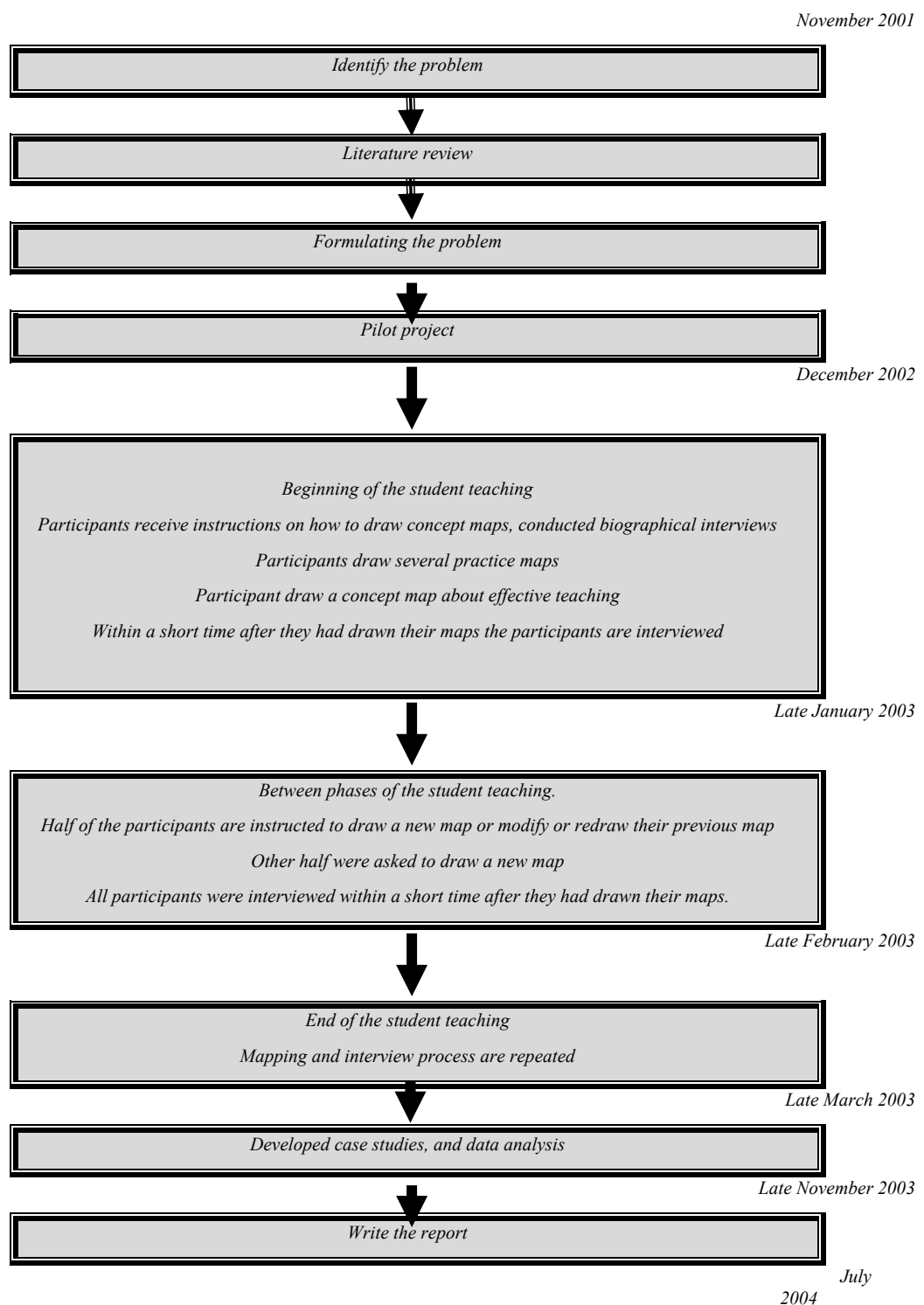


Figure 3.3. Steps of the study and time line

Chapter Four

Results of the study – Part 1

Introduction

In the following two chapters the data from the student teachers' concept maps and interviews are presented as case studies. Twelve participants were originally chosen for the study; two participants did not fully complete the concept mapping exercises, and therefore, ten case studies are presented.

This chapter is presented in two sections. In the first, the pre-service teacher education context in Sri Lanka will be introduced as well as an overview of what the student teachers brought to the study and how this is relevant. In the second five case studies of participants (pre-service teachers) with a Mathematics major will be presented. A concluding summary is included which integrates the ideas presented in this chapter. Chapter Five follows and presents another five case studies of participants with a Science major.

Sri Lankan context of pre-service teacher education

The student teachers participating in this research have brought to the study their prior formal and informal knowledge and experience gained within the Sri Lankan context. The twelve participants in the current study were selected from Science and Mathematics teaching diploma courses. Six of the students were undertaking a Science course and the other six enrolled in a Mathematics course. The knowledge and experience each person brought in general and the knowledge source will now be outlined in order to show where students are starting from, what is important in terms of the understandings these experiences bring and how these are relevant to this study.

All students who enrol in the teaching diploma courses in Sri Lanka have already passed the General Certificate of Education (Sri Lanka) at an Advanced Level (G.C.E-A.L.) and all are aged between 21 and 24 years. Generally the students are this age because it takes more than two years for the process of selection for the Diploma course and students have usually remained at home after completing their secondary education.

In keeping with the basic structure of the teacher preparation course put forward by the World Bank, these 3-year-teacher preparation courses are organised into three major areas: Subject Studies, Professional Studies, and General Studies. Generally, the first and second years of the course include a major subject study area, a professional study area and a general study area. In the first year, all students participate in practical experience in the form of model teaching and classroom observations and in the second year they participate in a twenty-day block of teaching (student teaching), which has two ten-day phases. This current study focuses on the examination of changes in student teachers' understanding about teaching during the two phases of the student teaching period in their second year. The third year of the course student teachers will complete their internship full-time in schools. During this third year the student teachers can apply and practice their knowledge gained through their college course and through their second year experience the student teaching under the supervision of the teachers and the principal at school. The college supervisors also provide some supervision. However, in practice, the student teachers spend their third year in schools as though they were regular teachers.

Before this student teaching period take place, the first year course content includes major areas: Science, Mathematics, Professional Studies and General Studies. The six Science student teachers in this research will have studied biology, chemistry, physics and integrated science as well as minor subjects such as mathematics and statistics. The six Mathematics student teachers will have studied pure mathematics, applied mathematics, and statistics together

with minor subjects such as integrated science. The Professional Studies component involves knowledge about the new secondary curriculum, the education system in Sri Lanka, and education elements, principles and psychology. Student teachers study these subjects through participating in a basic set of lectures and examinations together with the new curricula teachers' guides, pupils' textbooks, and workbooks. In this way student teachers make links between the theory of the new approach and how it is expressed practically in the curriculum. According to the NIE (2001) *Curriculum Implementation Paper*, the Professional Studies component is aimed at giving student teachers an overview of the education system in Sri Lanka. Although student teachers have gained substantial knowledge of the education system through their own school experiences, the assumption made here is they do not understand it as a complete system that goes beyond the school. Thus, as future teachers they are expected to engage with the 'national goals and policy for education', 'the structure of the education system', 'basic educational statistics and cost of education.

According to the NIE (2001) *Curriculum Implementation Paper*, in keeping with the participatory approach to students' learning and the continuous assessment program of the teacher preparation courses at NCOEs, many of the assignments to be done by the students are focused on topics beyond the college classroom. Therefore, the purpose of independence studies is to allow student teachers to study on their own or with a small study group as they wish. The intention is for student teachers to begin to develop skills in managing their time efficiently and productively.

Through this process student teachers are given a practical experience on how the learner organises knowledge and how children develop as learners. They receive an overview of the sociology of education and the significance of social, economic and cultural factors as well as 'cultural capital' in order to learn how these factors affect the education system in Sri Lanka. The processes of assessment and evaluation are also dealt with in detail to give student

teachers an introduction to the general tools and techniques used to measure the attainment and progress of secondary school children.

Prior to their practicum period the student teachers learn the content of Bloom's Taxonomy and are exposed to the important, far-reaching concept of the purpose of education as well as the various modes for developing education. Student teachers will have already gained awareness about developing their responsibilities in counselling and guiding secondary school children and their parents, especially those children with behavioural and learning disorders. They will have already learned about their rights, the regulations that affect them, and their need to develop teaching as a profession based on competence, commitment, compassion and a code of ethics.

During their second year student teachers participate in full-time teaching placement in school. These placements are identified as 'student teaching'. This student teaching period contains two phases. After completing each phase the student teachers return to their College for the reflective seminars and workshops. These seminars are organised to provide opportunities for students to reflect on their student teaching experience, to share them with the group, and to receive support from peers and expertise for solving problems concerning their practicum experiences. The seminars are conducted on both a small group basis and a whole class basis. Participants work collaboratively in small groups solving problems about the issues relevant to their teaching and then return to the whole class to share reflections and experiences they have explored and then formulate possible solutions. The student teachers are encouraged to argue and define their own ideas to the group rather than just accepting the course content and their solutions. It is important to note that all of the participants in this study were in the same 'reflection group' which may explain why there are similarities in their concepts chosen for map two and three.

Case studies of student teachers enrolled in Mathematics major

This section presents the first five case studies of pre-service teachers with a mathematics major: Shamalie, Kumar, Elvina, Sanjaya and Piyal. All data from these students' three concept maps and three interviews have been combined to develop the following five case studies.

Shamalie's case

Background

Shamalie is a student teacher with a Mathematics major. She comes from a very sought-after urban area, and had also studied at a highly regarded secondary school. That school maintained a very high academic level. At the time she was studying at that school Shamalie demonstrated high academic performance as well as being a leading athlete. She was perceived as a very bright student. Shamalie's family is from a high socio-economic background with both her parents being high-level administration officers. According to Shamalie, like her parents she wanted to engage in a very respectable profession as her career, and so she had enrolled in the teaching diploma course at the college of education in order to be a teacher.

In relation to her own mathematical abilities Shamalie made an important point that she believed that a mathematics teacher who taught her at her secondary school did not have good subject knowledge and did not use effective teaching and learning strategies in the classroom. So, she faced many difficulties in understanding some concepts related to mathematics. This negative experience helped her to form some initial thoughts on the role of an effective teacher. As a result of her reflections on those previous experiences, she now decided to use teaching and learning strategies that would bring greater understanding to her students. This was a very interesting and important reflection on her future career.

Moreover, Shamalie commented that she was very interested in developing her teaching skills, saying that what is needed to be a good teacher is sound subject knowledge, and good teaching skills. Within her coursework at the college, she had tried to gain more experiences and knowledge about becoming a better teacher. According to Shamalie, some subjects in her course were most helpful in providing knowledge about teaching, such as Teaching as a Profession, Educational Psychology and Educational Practice. At the initial stage of this study the only teaching experiences that she had gained from her diploma course were microteaching and classroom observation.

Shamalie's first concept map.

Shamalie developed her first concept map on paper prior to beginning her practicum as demonstrated below in Fig 4.1 a special seminar in her college. This concept map consists of two organisational concepts: 'human resources' and 'physical resources'; fourteen sub-concepts; nineteen relationships; and one crossed-link. It also has four levels or hierarchies.

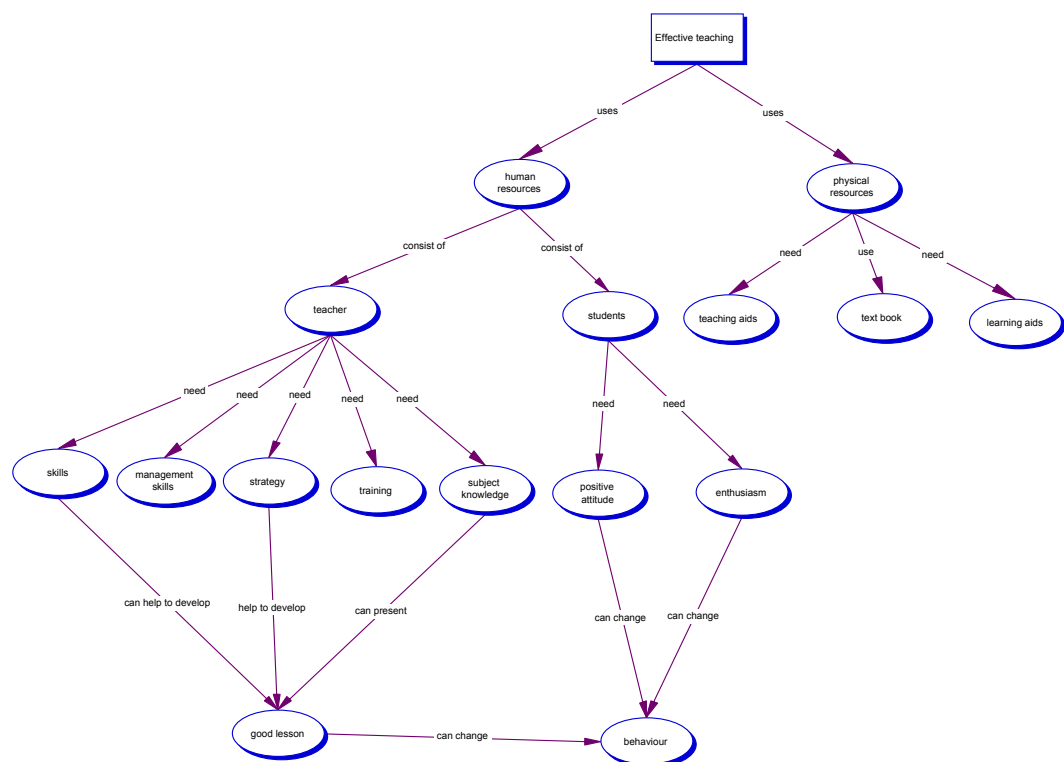


Figure 4.1. Shamalie's first concept map

According to her map, for effective teaching there needs to be the combination of human resources and physical resources. In her first interview Shamalie emphasised that human resources and the physical resources combine to achieve effective teaching. When asked what is good teaching, she replied:

It is a combination of these human and physical resources. You know, what I mean is when physical resources are available, the students and the teachers are effectively activated.

Under the first organisational concept of human resources Shamalie placed two sub concepts; ‘teacher’ and ‘students’. She highlighted that the teacher must have ‘skills’, ‘management skills’, ‘strategy’, ‘subject knowledge’ and ‘training’ to develop and to present a good lesson (see Fig 4.2). She emphasised that training was very essential for good teaching:

My opinion is that training is very, very important and essential. If the teachers have good training that means teachers will have relevant skills and knowledge about their teaching.

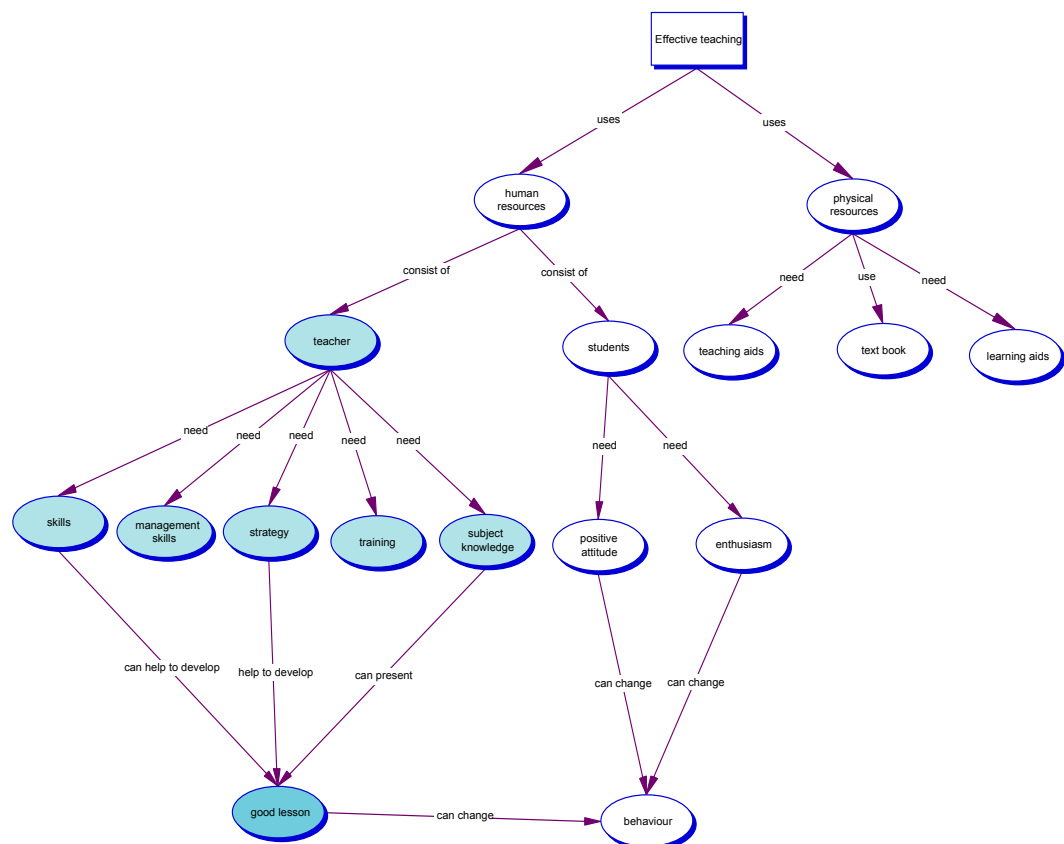


Figure 4.2. Development of the ‘teacher’ concept.

Her opinion was that good training could make a good teacher, which meant good skills as well as good subject knowledge. During the interview Shamalie mentioned that these essential skills consisted of teaching skills, evaluation skills, classroom management skills, professionalism, and enthusiasm. However, all these ideas are not shown in her first concept map.

Also under the organisational concept of 'human resources' is the first-level sub-concept of 'students', which includes two lower level concepts, 'positive attitude' and 'enthusiasm', and these two concepts are linked to the concept of 'behaviour'. This suggests that she believed that a students' enthusiasm and positive attitude were important to a student's behaviour. The concept of 'good lesson' is also linked with the concept of 'behaviour', suggesting that Shamalie believed that a good lesson involved good student behaviour.

In her first map, 'training' is a separate concept under the 'teacher' concept, which is not linked with other concepts. According to Shamalie, 'strategies' meant teaching strategies such as group teaching, cooperative teaching, and lecture methods, and the teacher should use these strategies to develop a good lesson. A teacher's sound subject knowledge was also needed to develop a good lesson, according to Shamalie.

Shamalie believed that students needed positive attitudes relevant to their studies, and that they also needed to be concerned about their learning in order for effective teaching. Shamalie found that these positive student attitudes and concerns helped the teacher to teach effectively.

Under the second organisational concept of 'physical resources' she places three concepts: 'teaching aids', 'learning aids', and 'textbook'. She further explained how appropriate physical resources helped teachers and students to fulfil their own aims, create an effective learning environment and enhance teachers' and students' motivation. When a good lesson is presented, students' positive behavioural changes could be seen.

Shamalie's second concept map

In her interview for her second concept map, Shamalie commented that she had completed her first student teaching phase without any problems. The practicum site was a very popular national school. It had a professionally strong principal, who maintained a good administrative structure within the school and a sound study environment. This school had very good relationships with outsiders and especially with the parents. According to Shamalie, she gained more and valuable experience from her practicum site.

My practicum school maintained a very good academic environment and good relationships between students, teachers, as well as parents.

It was a very good opportunity for me to develop my knowledge.

The practicum site study environment was very helpful for Shamalie to present her teaching well. She commented that the students were more interested to learn many things, and the classroom environment was also well maintained with many resources and equipment. The teachers were very cooperative and parents helped to develop effective classroom physical resources, Shamalie claimed. Both teachers' and students' attitudes were positive towards developing the classroom and school environments as well as towards learning.

Within this environment, Shamalie identified and understood the roles and relationships between the school and community. Moreover, Shamalie received good advice and instruction from her practicum site principal. The principal always monitored and guided her to present good lessons. *This was a great help*, Shamalie claimed. Other teachers as well as the principal supervised and advised Shamalie on how to teach effectively. This pleasant and positive environment helped Shamalie to develop her understanding about teaching.

Immediately after Shamalie finished her first practicum phase she developed her second concept map at the special college seminar. Before developing her second map, the map that she had constructed previously at the beginning of her practicum was presented to her. Shamalie modified her previous map by adding several concepts and adding some structural changes. This map indicated new understanding and knowledge about teaching.

Shamalie's second concept map retains the same two main concepts, 'human resources' and 'physical resources', but she added new sub-concepts under each of these concepts from the first concept map. For example, she added the concepts of 'personality', 'positive attitudes' and 'critical thinking' under the concept of 'teacher', and the concepts of 'family background', 'needs' and 'learning skills' under the concept of 'students'.

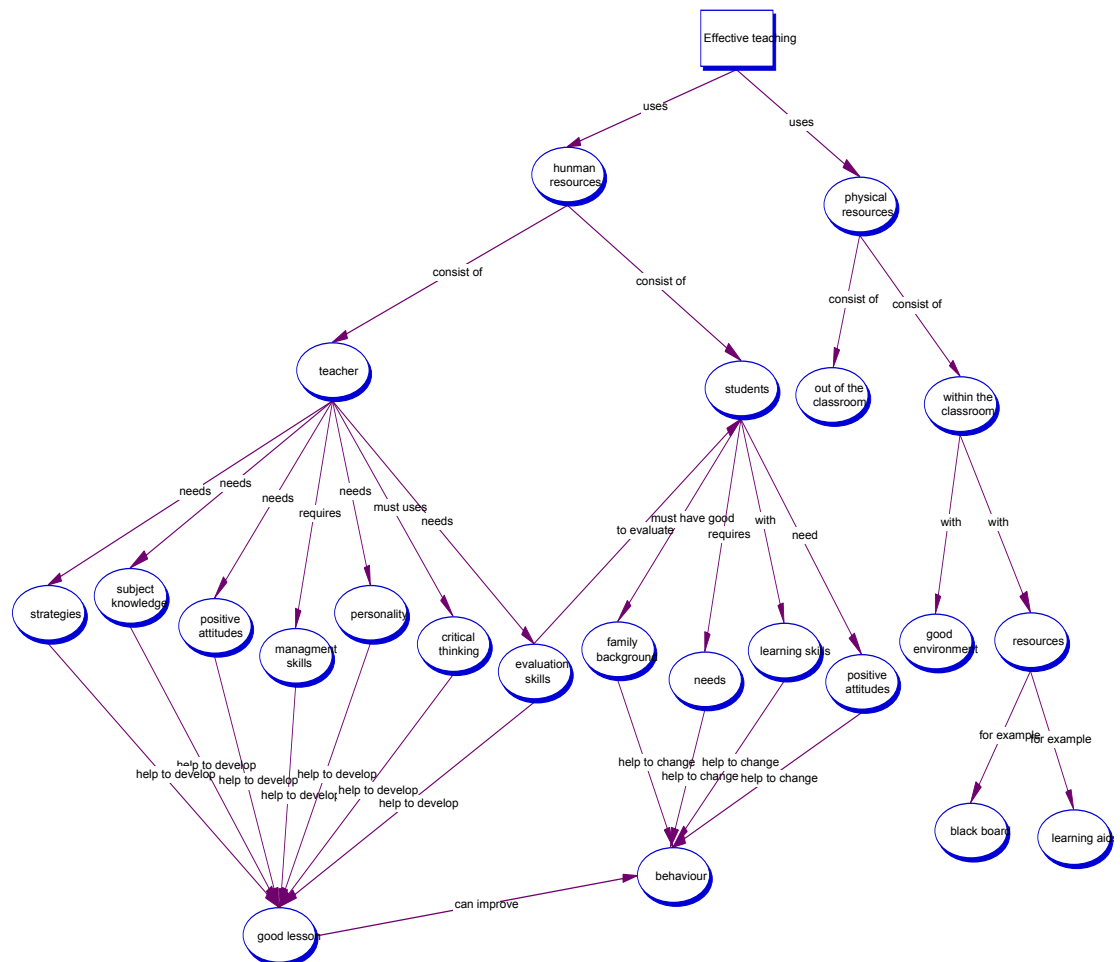


Figure 4.3. Shamalie's second concept map

While retaining 'students' and 'teacher' under the 'human resources' concept Shamalie changed all the concepts under the 'physical resources' cluster concept of her first map, to 'within the classroom' and 'out of the classroom'. Shamalie also added four new concepts under the organisational concept of

‘teacher’, ‘positive attitude’, ‘personality’, ‘critical thinking’, and ‘evaluation skills’, and deleted two concepts, ‘training’ and ‘skills’, from her first map.

Finally, all the concepts under the ‘teacher’ concept are still the same as first map, focused on ‘good lesson’, and those under the ‘student’s concept on ‘behaviour’. ‘Good lesson’ is also still linked to ‘behaviour’, as it was noted that a good lesson could change students’ behaviour.

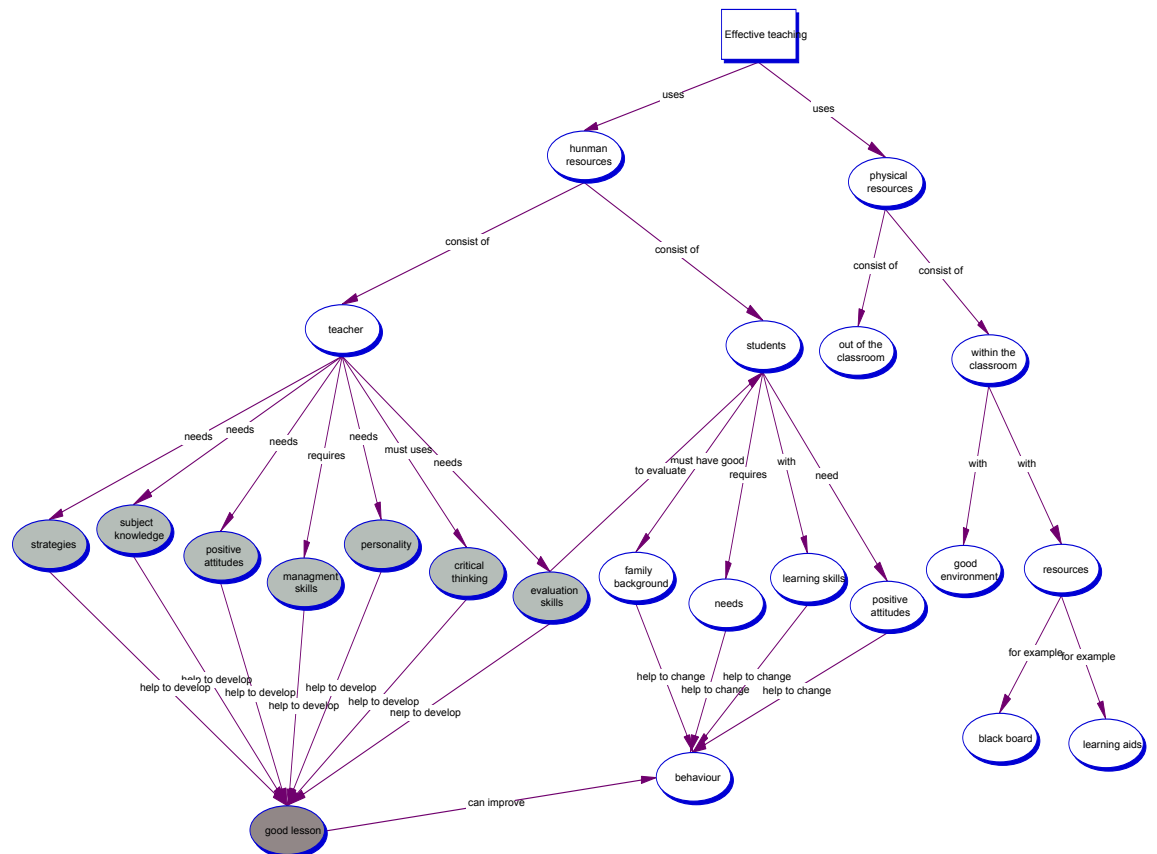


Figure 4.4. Development of ‘teacher’ concept

In her second interview, Shamalie mentioned that as she gained experience from the real classroom situation, she realised more fully the needs and the roles of the teacher:

If you gain real classroom experiences, you can realise what good teaching is and what you need for that.

Her second concept map suggests that she understands a teacher as needing good subject knowledge, a positive attitude, managing skills, evaluation skills

as well as a good personality. The teacher also needs to use critical thinking about his/her teaching in order to develop its effectiveness. According to Shamalie:

You should be thinking critically about your teaching, about your students, and their learning. Finally, you can understand more about your roles.

So, she said that teachers should go to their classrooms with all these skills, to achieve both their own and the students' goals, *otherwise, teachers may have to face many difficulties*. She especially mentioned that the teacher's personality was a major factor in good teaching. This, she believed, is because the teacher with a good personality could manage their classrooms more easily.

On the other hand, the students should have good learning skills and the need to achieve their goals. Moreover, a positive attitude will help to change their behaviour:

You know, as I mentioned earlier, students are very important to fulfil effective teaching; they need good attitudes and goals. From my experience, I can say family background also affects their learning.

The necessary learning skills, goals and needs could be seen very clearly with students who came from a good family background, Shamalie stated. In her opinion appropriate physical resources in the classroom and in the school are *very helpful for students and teachers to achieve good teaching and learning*.

Shamalie's third concept map.

After she had gained further experience from her first two practicum phases Shamalie came back to the college for a three-week period. Within this period Shamalie participated in two reflection sessions and a workshop. She noted that the workshop and reflection sessions were very important to further develop her knowledge about teaching. She discussed and analysed her student teaching site experience in detail with her colleagues, as well as her

supervising lecturers, and she also wrote some reflection reports. All student teachers in her group discussed how they had improved their new understanding in their second student teaching phase.

In her second practicum phase Shamalie tried to apply her new understanding to her teaching. Most of the student teaching site colleagues helped Shamalie to implement and improve her new understanding. In particular, she stated that her mentor teacher's encouragement and the principal's support were very important. Immediately after her second practicum phase Shamalie developed her third map in the special session at her college. Before she developed her third map the previous two maps, which she had drawn at the beginning of the student teaching and after the first student teaching period were presented.

Shamalie's third concept map is rather different from her previous maps. The major shift is that in her third concept map effective teaching consists of six main cluster concepts: 'good administration structure', 'students', 'others', 'teacher', 'resources' and 'parents'. There are sixteen sub-concepts, twenty-seven relationships, eight cross-links and five levels of relationships.

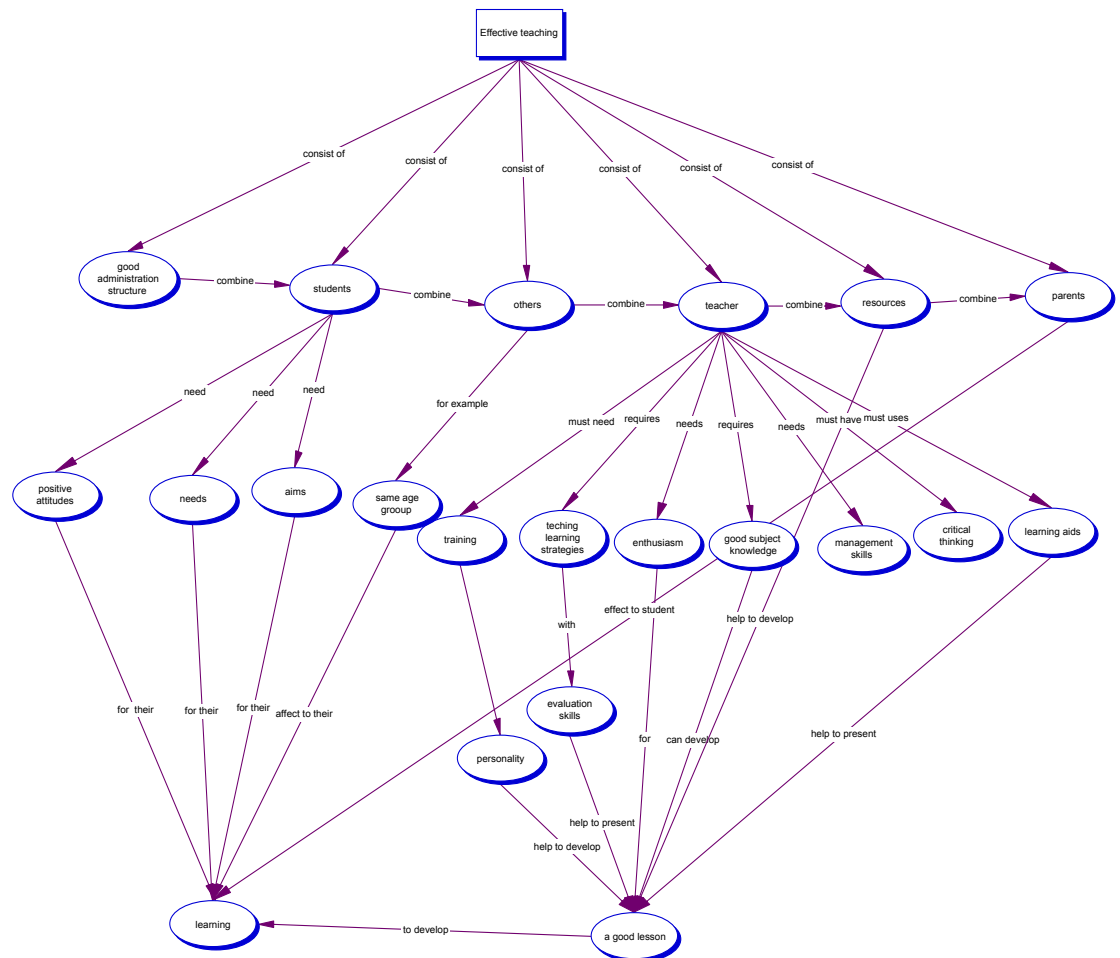


Figure 4. 5. Shamalie's third concept map

All the main cluster concepts are linked together. Shamalie commented that, *all these concepts work together to develop effective teaching*. In this third map she has also developed more concepts under the main or organisational concepts of 'students' and 'teacher'.

The first organisational concept of 'good administrative structure' has no sub-concepts under it. Under the second organisational concept of 'students' she has now drawn three concepts: 'positive attitudes', 'needs', and 'aims'. All these concepts finally focus onto 'learning'. This suggests that she now understands students as requiring positive attitudes, needs, and aims for their learning. Under the third organisational cluster concept of teacher she has placed seven concepts related to the requirements of teachers in order to accomplish effective teaching. These are 'training', 'teaching learning

strategies', 'enthusiasm', 'good subject knowledge', 'management skills', 'critical thinking', and 'learning aids'. The concept of 'personality', which was a sub concept in her second map, is now placed under the organisational concept of 'training' and the concept of the 'evaluation skills' now moved under the concept of 'teaching learning strategies'. However, most of these concepts under the 'teacher' concept finally focus on how to develop and present a 'good lesson' (see Figure 4.6). The concept of 'good lesson' is linked to the concept of 'learning', suggesting the culminating relationship between a good lesson and the development of students' learning.

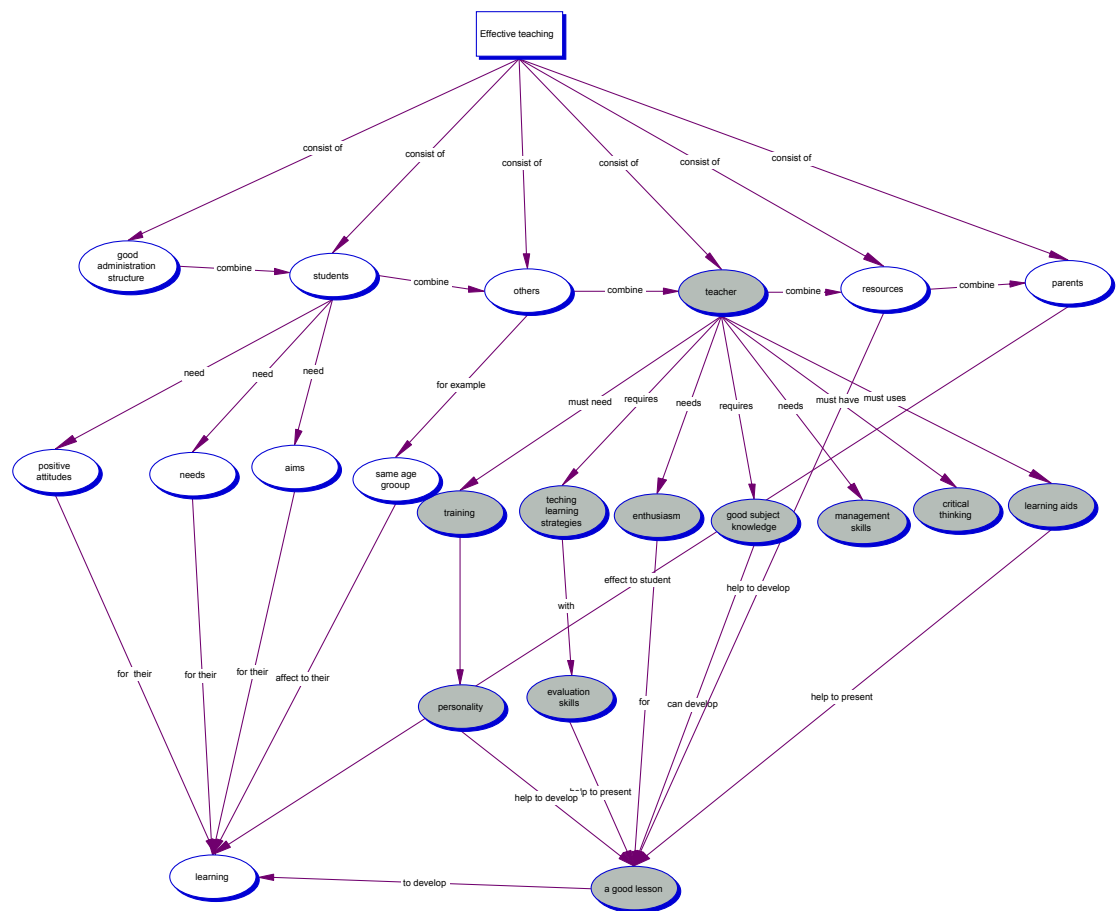


Figure 4.6. Development of 'teacher' concept

In her third map Shamalie has not further developed the concepts of 'good administration structure', 'resources', and 'parents'. However, the 'parents' and 'other' concepts have finally been linked to the concept of 'learning', and the concept, 'resources' has been linked to 'a good lesson'.

Another major shift in her third concept map is Shamalie's deletion of the organisational concepts of 'human resources' and 'physical resources', which were present in her second concept map, and the addition of six new organisational or main concepts. However, two concepts ('students' and 'teacher') from these six concepts were in her second map, not as the main cluster concepts, but as sub-concepts under the main concepts. This means that she has reorganised all concepts related to teaching according to her new knowledge and experiences. She has identified more concepts related to teaching: 'parents', 'others', and 'good administration structure'. This is a very important point because in this last map Shamalie has now identified a greater number of concepts and inter-relationships relevant to teaching effectiveness. All the concepts in her third concept map finally focus on student learning, a significant development in her teaching, because at this point she was able to identify effective teaching in terms of students' learning.

In her third interview, Shamalie noted that she had recognised more relevant concepts related to teaching.

After my student teaching experience, I really understand the relevant issues for effective teaching. That is why I have reorganised my map.

The major factor in Shamalie's reorganisation of her third map was her new student teaching experience. She emphasised that effective teaching was to develop and improve students' learning, and in order to develop students' learning, the teacher needs to consider more issues. School administration structure, parents' participation, the available resources in the school, classroom environment, were some of the concepts added to 'students' and 'teacher'. If the school has a good administration structure, it can create a good learning environment within the school, according to Shamalie:

You should consider many things to achieve your teaching. Firstly, the school and classroom environments must really be suitable to learning.

The resources the school had should be identified, as they help teachers to present a good lesson. Shamalie mentioned that the 'teacher' was the main factor in effective teaching. According to Shamalie in order to develop effective teaching the teacher requires good subject knowledge, good strategies, and to present a good lesson. Teachers' enthusiasm was also a very important issue for effective teaching because teachers' attitudes and actions directly influence students learning. The teachers must have management skills, otherwise teachers face many problems related to students' behavior and their learning. If the teacher lacks these skills then the teacher could not solve these problems. In Shamalie's opinion:

*If you do not have these skills you will be a failure, definitely.
You should be a skillful teacher, creative teacher, knowledgeable
teacher, and you should always be a flexible teacher.*

This was the most important point that she mentioned. It suggests a much deeper understanding of and knowledge about teaching after her student teaching experiences. She also commented that the teacher could use more resources, for example learning aids, to develop lessons.

On the other hand, the attitudes and needs of students were also important for effective teaching, according to Shamalie. They must have positive attitudes and needs for their learning, and they also need clear aims for that leaning. That is, for Shamalie, if the students can engage in the learning environment, it becomes very easy to present a good lesson.

Shamalie further indicated that an effective teacher must be able to understand the relevance of 'outsiders' to their teaching. Such outsiders include parents and others. 'Other' also meant other students in the classroom and those outside who could influence students' learning. For example, parents could help students in many ways to develop their learning including through academic support and supplying day-to-day needs:

The parents can influence their children in many ways. They can give academic support, can guide them and they can give some counseling. They can arrange a suitable learning environment in their homes. If parents give their full support to their children then they are ready to learn.

Shamalie's third concept map is very complex, with many more concepts, relationships and cross-links. However, all the concepts finally focus on developing student learning. This point is very important as it appears to show her reorganisation of her knowledge about teaching. After the student teaching period, she appears to have understood that effective teaching means the development of student learning.

Summary of the Shamalie's case

In summary, Shamalie's concept of good teaching became more complex with many relationships and cross-links over the duration of the course. Her final concept map is very detailed with many interrelationships between the concepts. This demonstrates her deep reflection during and after her practicum teaching experience.

Kumar's case

Background

Kumar is a mathematics student teacher who came from a rural area with few facilities. A very interesting point is that Kumar had had some teaching experience during his own schooling. When he was studying at an advanced level, at a time he was also a school prefect, and had spent several months teaching grades six and seven students. He had to teach because there was a lack of teachers in his school at that time. He also claimed that he had not much understanding and knowledge about teaching at that time.

I was at the advanced level but really had very little knowledge.

So I only did the best I could do with my limited knowledge.

During the time between leaving school and entering college he had also served as a private tuition master. He taught mathematics and science to secondary school students. As a tuition master he had faced more challenges because there was a lack of facilities in the rural area where he was engaged in teaching. He mentioned that while facing those challenges he had tried to teach his students successfully:

I only had poor facilities as a tuition master, but I taught the best I could.

According to him, Kumar loved teaching and the students very much. He wanted to become a good teacher with a good knowledge about the subject and the profession. He further mentioned that since enrolling at the college he has gained much more knowledge about teaching. He believed he had gained some theoretical knowledge about teaching from the subjects such as Teaching as a Profession and Education Psychology within his diploma course.

Kumar's first concept map

Kumar drew his first concept map in the special seminar at the college before participating in his practicum. Kumar's personal beliefs and theoretical knowledge gained from the college and from his own experience had helped

him to organise his ideas about teaching, and provided him with the concepts in the map. Further he mentioned:

My teaching experience and college experience help me to gain knowledge about good teaching. I have always tried to be a good teacher so I want to learn more about teaching.

Kumar's first map consists of eleven concepts, including three organisational concepts, eleven relationships, one cross-link, as well as three levels or hierarchies. The three organisational concepts are 'training', 'experiences', and 'teaching ability'.

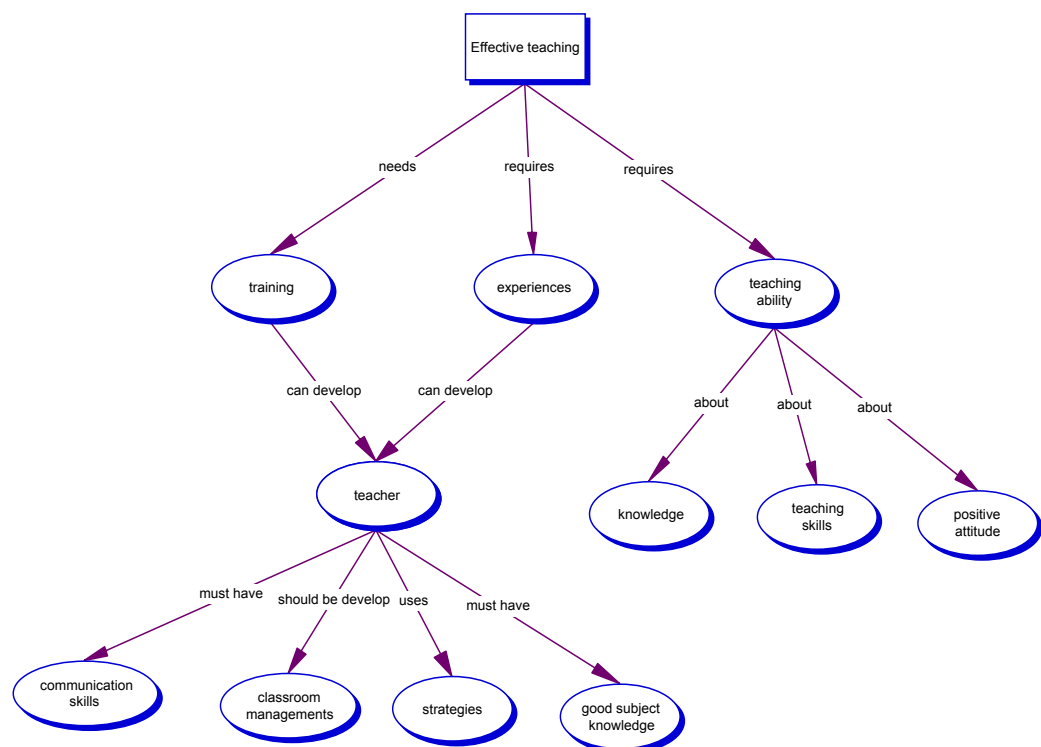


Figure 4.7. Kumar's first concept map

Under the first organisational concept 'training', he placed 'teacher', which had four concepts under it. Kumar's map indicates that teachers must have communication skills, should develop classroom management skills, must use good subject knowledge and must develop strategies in order to achieve effective teaching.

His second organisational concept, 'experiences' is also cross-linked to the teacher and followed by the same four concepts. Kumar stated when interviewed that teacher skills are developed by their training and experiences.

The third organisational concept of his first map, 'teaching ability' is linked to 'knowledge', 'teaching skills', and 'positive attitude'. This demonstrates his belief that the teacher's ability was important for effective teaching and that it consisted of adequate knowledge, skills, and appropriate attitudes.

In his first interview Kumar emphasised that training and experience were needed to make a good teacher. He pointed out that the concepts of 'teacher' and 'teaching ability' were different;

The teacher is a person such as others, but empowered by the state, and teaching ability means a teacher must have relevant strategies and use them effectively.

The teacher with good teaching ability would be a good teacher, he stated.

Kumar explained that the knowledge that came from the 'teaching ability' concept was derived from knowledge about student learning, knowledge about their students and their subject as well as overall knowledge about teaching. According to Kumar these were very important because:

If you can evaluate your student, that means you have a good knowledge about your students, so, and then you can guide them very well.

However, these ideas raised in his interview are not shown visually in his first concept map. This may be attributed to the limiting ability of the concept map to expand on the concepts. Kumar also explained in the interview that teaching skills included teaching methods and strategies. Also a positive attitude means that the teacher must be motivated to be a good teacher, not just rely on the position. He further explained that:

You know, teaching is a very respectable profession. So, a teacher must have a good attitude. But today, you know, people come to this profession as just a job. They need just a job. Not to be a good teacher. They haven't got good attitudes about this profession. So, how can they become a good teacher?

When Kumar was questioned he stated that his concept of 'communication skills' meant a good ability to pass on good knowledge, that teachers need to be able to understand the students at their own level, or they could not be a good communicator. He explained that teachers must be able to manage learning and behavioural problems.

Sometimes in your classroom, you have many problems. It is not easy to resolve and control. If you have some students with behavioural problems, you must attend to the problems. You must tackle them very well. Otherwise you may have faced big problems. You know, these communication skills, which you have helps you to solve such problems.

Kumar also mentioned that subject knowledge and strategies were also important to good teaching. He explained that by good subject knowledge he meant a sound knowledge about the subject content. Also, the concept of strategies was broader and he identified methods which teachers use in their classes: for example, lecture method and group teaching method, and some times cooperative learning methods.

He further mentioned the importance of these methods because:

These methods are very helpful to present your lesson. You must have good skills for those methods.

Again it is important to note that many of these ideas are not included in his first concept map. His map showed more of a general picture of teaching and teachers, rather than specific teaching factors.

Kumar's second concept map.

Kumar drew his second concept map at his college in the special seminar just after he finished the first student teaching phase. He was asked to complete a second map without reference to his first map. According to Kumar's comments, he had a very experienced mentor teacher and had been guided by this mentor teacher very well in his first student teaching phase. Kumar mentioned that he gained much experience and knowledge from this mentor teacher:

My mentor teacher's class was very organised and resourceful, and all classroom routines and students' activities were very well organised. So, this classroom environment was a good learning environment.

Kumar commented that the students in his mentor teacher's class appeared to be ready to learn. This situation, Kumar further claimed, contributed to his positive experience and greater knowledge about teaching.

Kumar's second concept map was much more detailed and complex with many new concepts added and many cross-linked to each other. This concept map (see Figure 4.8) consists of fifteen concepts including five organisational concepts related to the topic, eighteen relationships, seven cross-links, as well as four hierarchies. According to his second map, effective teaching consists of five main or organisational concepts: 'training', 'teacher', 'teaching ability', 'experiences', and 'students'.

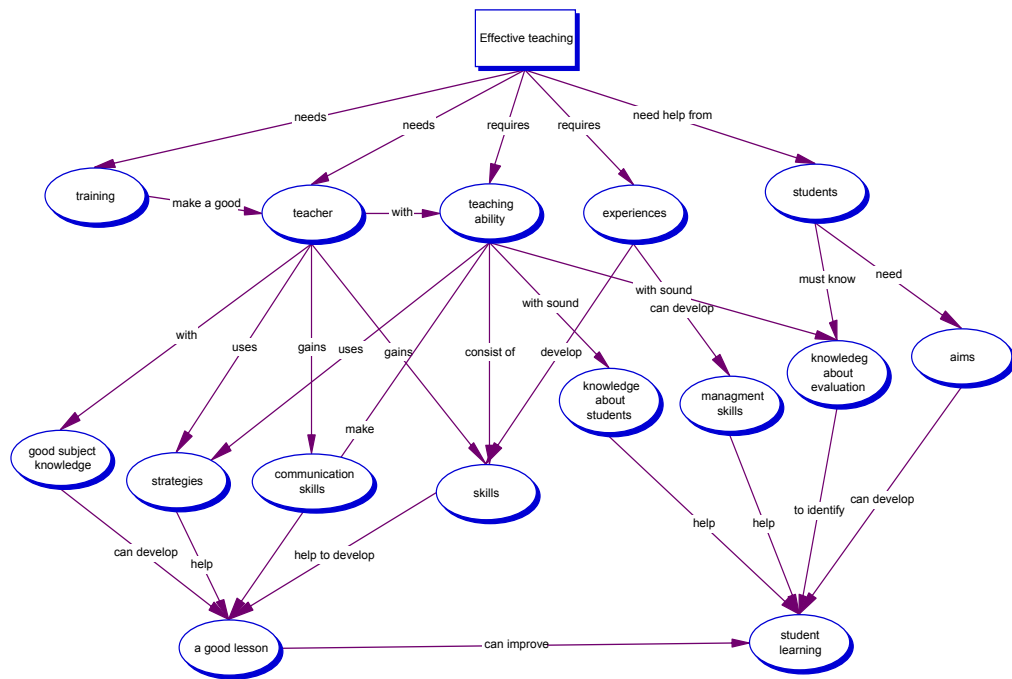


Figure 4.8. Kumar's second concept map

The first organisational concept is 'training' and has no concepts under it. However, 'training' and the second organisational concept, 'teacher' are cross-linked. Under 'teacher' are the sub-concepts of 'good subject knowledge', 'strategies', 'communication skills', and 'skills'. According to the map, when the teacher provides good subject knowledge and uses good strategies, has communication skills and other skills then a good lesson would be the result. This organisational concept of 'teacher' is also cross-linked to the main concept of 'teaching ability', which is cross-linked back to 'strategies' as well. So, teaching ability can develop good strategies, which will in turn result in a good lesson, according to Kumar's second map.

The third organisational concept is 'teaching ability'. The map shows that good teaching ability consists of 'skills', which help to develop a 'good lesson', but good teaching, can also lead directly to a good lesson, which can then improve student learning. 'Teaching ability' is also shown to be linked with sound 'knowledge about students' and sound 'knowledge about evaluation'. Good knowledge about students and evaluation techniques help student learning, according to Kumar's map. Moreover, 'teaching ability' is cross-linked to the

main concept of 'teacher'. This shows that he believed teaching ability produced a good teacher.

The fourth organisational concept 'experiences' leads to 'skills' and 'management skills'. According to Kumar's map effective teaching requires experiences, which will develop good teaching skills and good management skills. Student learning is shown as the result of effective management skills.

The final organisational concept is 'students'. Under 'students' are the concepts: 'knowledge about evaluation' and 'aims'. This shows that students need aims for effective learning. Student learning is the end result of all the factors involved in effective teaching on Kumar's second concept map. A good lesson is now leading directly to student learning; that is a good lesson can improve student learning. In the interview Kumar stated that, *from the student side, good learning is also a part of teaching*.

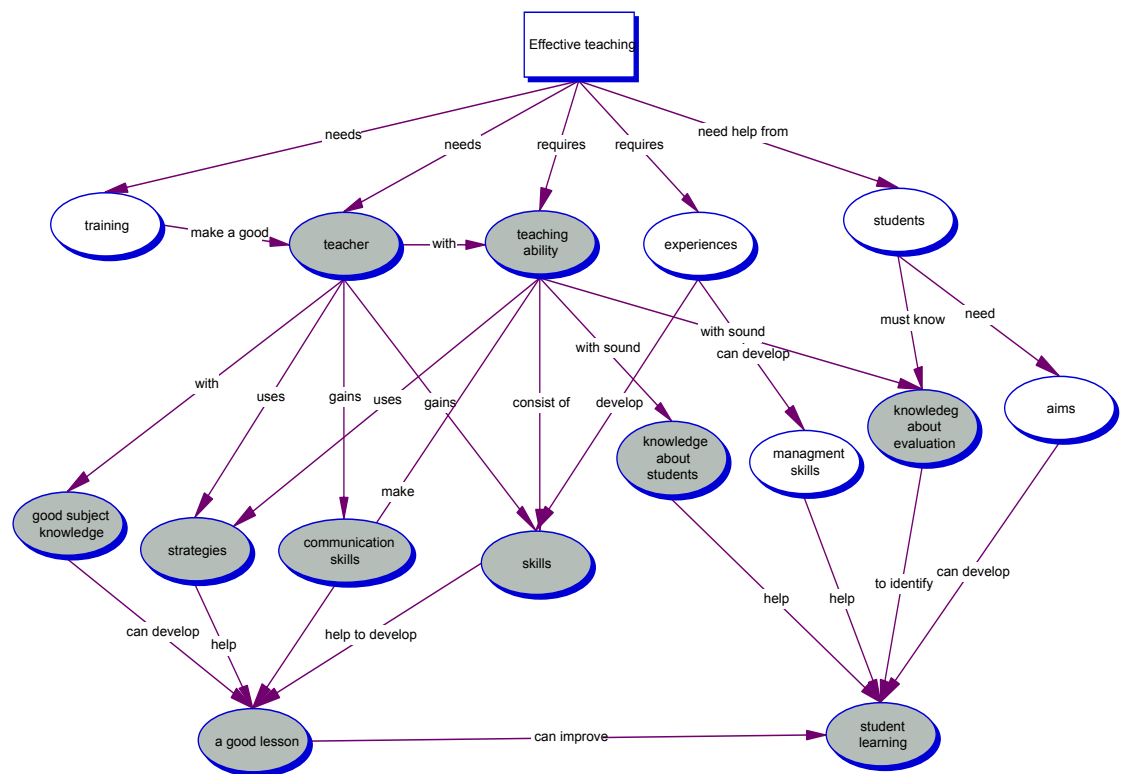


Figure 4.9. Development of the 'teacher' concept.

In his second interview Kumar explained that he had changed his map, and his reasons for doing as:

You know, a very interesting thing is I saw more activities related to students' work. So, they are the active participants in the classroom. We need to give important, specific place to them.

He believed that teachers should identify students' abilities and needs because there are very important for effective teaching.

Kumar also mentioned that in his first map he placed the concepts of 'teacher' and 'teaching ability' as separate concepts, as he believed the teacher plays a certain role in the teaching process, therefore the teacher's ability is a separate concept. However, in the second map he linked these two concepts together, because he now believes that a good teacher is a teacher with good teaching abilities. In the first map there was no cross-linking of these concepts but now, he explained, he saw how all the elements come together in a continuous process:

Teacher and teaching ability come together, because as a good teacher you must have good ability. Without this ability you can't act out your roles very well, so these two concepts come together.

Kumar's identification of the importance of the relationship between the teacher and teaching ability may be the result of his achieving a broader understanding of teaching from further teaching experience. For example, he said he realised that while many concepts are needed to develop a good lesson, a good lesson is necessary to develop student learning. The organisational concepts of 'teacher' and 'teaching ability' are focused towards a good lesson, and the organisational concepts of 'experience' and 'students' are focused towards student learning. Kumar explained:

What you want to present is a good lesson, it is relevant to improve students' knowledge and their learning.

Another important point is that in his second map Kumar identified the concept of 'students' as directly related to the concept of 'effective teaching'. In his first concept map he showed no concern about the students. In the second, he extended 'student learning' to the necessity of their having aims and a need to learn.

In his first concept map all the concepts of teaching were shown separately, however, all concepts in the second map lead to and are focused on a 'good lesson'. Also, all the concepts under 'teaching ability' and 'students' focus on 'student learning' which he shows as the same for a good lesson, because it improves student learning as well. This is a significant point because it means that Kumar changed his understanding of how to achieve effective teaching.

Kumar's third concept map

After the first phase of his practicum and prior to the second phase Kumar spent three weeks at the college. At that time he participated in two reflective sessions at the college in which he had more opportunities to discuss questions related to the practicum and practicum experiences with his colleagues. In addition he participated in two reflection workshops. At the workshops his lecturers had asked him to present his experience to all the class, and he discussed issues related to his experience. These workshops provided student teachers, including Kumar, with opportunities to discuss, reflect on and improve their knowledge related to the practicum experience issues. The results of these reflection sessions and workshops and his own reflections helped him reorganise his knowledge about teaching:

These workshops were very important me to discuss my problems and reorganise my knowledge with my friends and lecturers. And you know, I gained more ideas from them. All those things affected me to reorganise my knowledge.

Kumar also tried to implement his new knowledge in the second phase of his practicum, as his lecturers had urged. In addition to his mentor teacher's help, the principal of his practicum site was also very helpful to Kumar, during the second phase of the practicum. The principal guided him and gave him

instructions about how to maintain the classroom environment and how to conduct a good classroom. In addition, college lecturers had conducted several lectures related to the practicum between the first and second practicum phases. Possibly as a result of all these factors, Kumar's third concept map became very organised and more complex. Kumar drew his third concept map immediately after his practicum period. It has twenty-two concepts including two main concepts, twenty-one relationships, thirteen cross-links, as well as five levels or hierarchies. His third concept map is constructed with two organisational concepts: 'good teaching and 'good learning'.

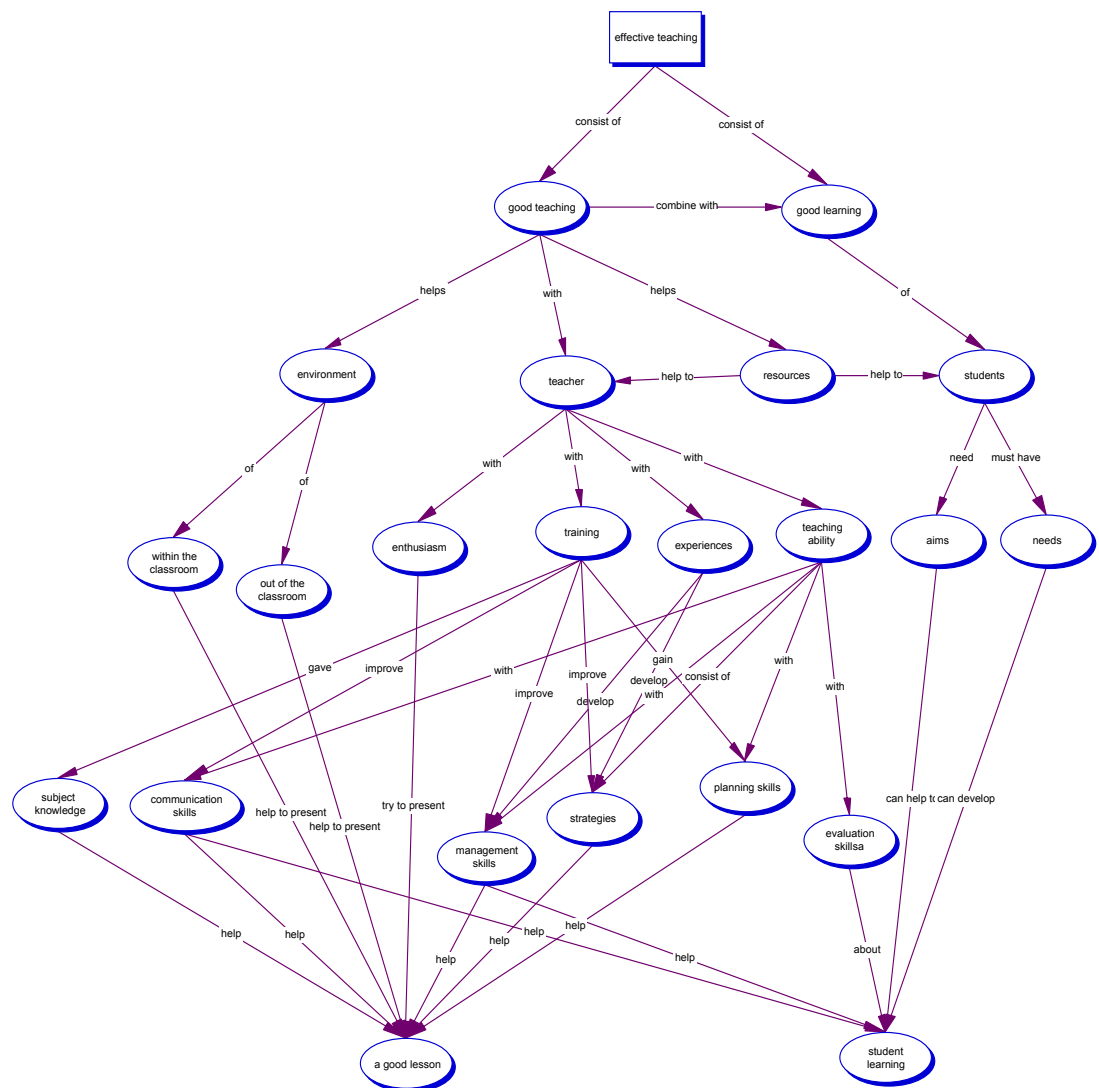


Figure 4.10. Kumar's third concept map

In addition, ‘good teaching’ and ‘good learning’ were cross-linked, demonstrating that these two concepts are were to be inter-related. This suggests that Kumar was beginning to develop a broader picture of effective teaching in that learning and teaching were now seen as necessary for effective teaching. According to the map ‘good teaching’ is also associated with the concepts of ‘environment’, ‘teacher’ and ‘resources’.

The environment concept is related to the concepts of ‘within the classroom’ and ‘out of the classroom’, which both ‘help’ to contribute to a good lesson. This demonstrates a broader understanding that school environments also help to develop good teaching as well as effective learning. Under the ‘teacher’ concept are ‘enthusiasm’, ‘training’, ‘experiences’ and ‘teaching ability’ which all link directly to a ‘good lesson’ (see Figure 4.11).

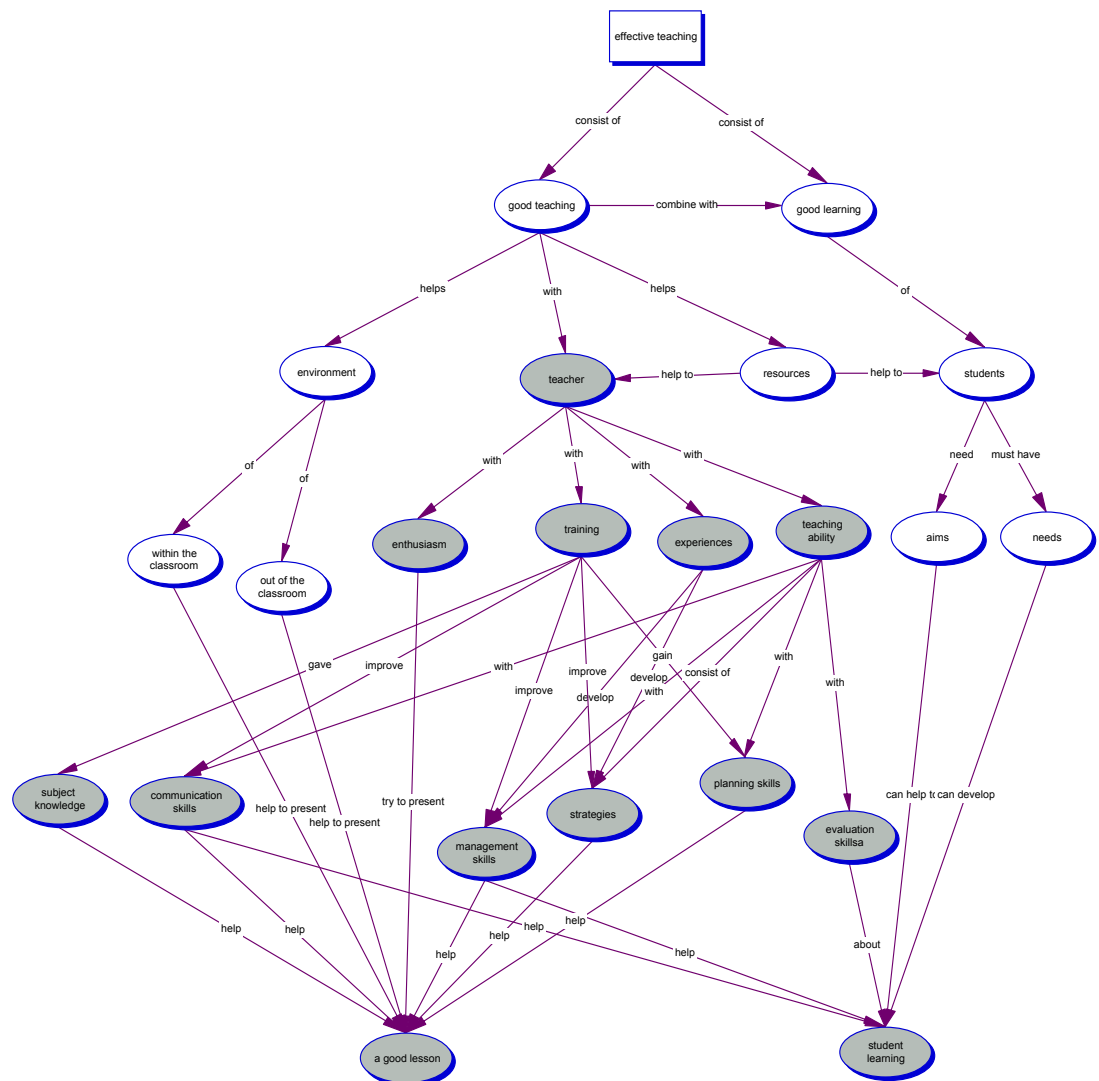


Figure 4.11. Development of the ‘teacher’ concept.

'Training' is linked to: 'subject knowledge', 'communication skills', 'management skills', 'strategies' and 'planning skills', which all 'help' to develop a good lesson. 'Experiences' is also linked with 'management skills' and 'strategies'. The other concept under 'teacher' is 'teaching ability' which is linked to concepts of 'communication skills', 'management skills', 'strategies', 'planning skills', and 'evaluation skills', which again all are related to the result of a 'good lesson'. Importantly, in this map other links are evident, such as 'communication skills' and 'management skills' as facilitating student learning. It is interesting to note that the new level one sub-concept 'enthusiasm' is not joined to 'management skills', 'strategies' and 'planning skills' as are the other sub-concepts at this level, suggesting that Kumar placed particular emphasis on the contribution of this factor.

The big shift in this map is that the organisational concepts, 'experience', 'teaching ability' and 'training', in Kumar's second map are now third level sub-concepts, under 'teacher'. Also, the organisational concept of 'teacher' in his second map is now a sub-concept, which indicates that teachers can develop their training and teaching experience. The 'resources' main concept in the second map now appears under 'good teaching' and is linked to 'students' and 'teacher'. It is suggested by this map that 'resources' help students' 'learning' and help teachers to present a 'good lesson'.

The other organisational concept is 'good learning'. Kumar's third map shows that good learning of 'students' is related to two new concepts: 'aims' and 'needs'. Students must have learning 'aims' and 'needs' before achieving learning, according to the third concept map.

In his third interview Kumar commented on why he organised all his concepts of 'effective teaching' under the two main concepts of 'good teaching' and 'good learning': *these two concepts are very important when combined together*. According to Kumar, good teaching requires a good environment both inside the classroom and outside the classroom. If a good learning

environment exists then good teaching can occur because students are ready to learn.

In his third map Kumar reorganised the concepts of ‘experience’ and ‘training’ under the ‘teacher’ concept, because as he explained, the ‘teacher’ was the most important concept:

Now I believe teacher is very important rather than training and experience. As a teacher if you have a good training you know more about your profession. I believe well trained, experience teachers have good knowledge, skills also ability for their work.

According to Kumar, as the teacher gains experience and training, the teacher gains good knowledge about their profession. When this occurs, they have sound subject knowledge, good knowledge about their students and evaluation knowledge as well as good classroom management and teaching skills. Kumar further mentioned that, when effective teaching occurs, both the teacher and students are more active in fulfilling their aims. So, when this happens good teaching and good learning can be demonstrated. That is why he categorises all concepts under the concepts of ‘good teaching’ and ‘good learning’.

Kumar also emphasised that he reorganised his concept structures about teaching from his further practical experience as well as from his mentor teacher and from the college lecturers who guided him to better understand teaching situations. According to Kumar his mentor teacher and the classroom environment were most influential in his reorganising his ideas about teaching:

My mentor teacher's classroom environment was very organised. She collected more resources, and she had made a good learning environment within her classroom. All the students were ready to learn, and they had aims to learn.

Summary of the case

In conclusion, it appears that as Kumar gained more real school experience he further developed his knowledge relating to effective teaching. In his first concept map all concepts were only associated with the teacher. This possibly demonstrates that he believed only the teacher was important for effective teaching. Clearly, however, after gaining more classroom experience Kumar realised that not only the role of the teacher but the students and their learning were also important. His reflection upon his real school situation experience had provided extended understanding of and knowledge about teaching. Finally, Kumar included both good teaching and good learning as necessary for effective teaching. These appear substantial shifts from the simplicity of the first concept map to Kumar's final concept map of effective teaching.

Gaining more experience in his real teaching situations and the results of the reflection sessions helped Kumar to identify more and more concepts and to reorganise his knowledge related to teaching. Effective teaching for Kumar became focused directly on the broader understanding of and improving both teaching and learning. Finally, his new understanding of what is needed to achieve a good lesson, which in turn can improve student learning, created a broader view of what constitutes effective teaching.

Elvina's case

Background

Elvina is a 23-year-old female student teacher with a mathematics major. She came from a rural area that was not rich in resources, where most of the people were also very poor. Elvina faced many difficulties when studying at secondary school, such as malnutrition and a lack of resources, particularly textbooks.

At the time she was in grades eleven and twelve she had a very competent and experienced teacher as her class teacher, who did the best she could to develop her students' learning. Not surprisingly, Elvina found this teacher an inspiring model so she decided to be a good teacher as well. In fact this was her main reason for deciding to become a teacher, couple with the respect and recognition teachers received in her home village. So, after passing her advanced level examination Elvina entered a college of education where she tried to gain more understanding of teaching and a formal teaching qualification.

Elvina already had some theoretical understanding about teaching from her diploma course subjects (Educational Physiology, Teaching as a Profession, and Teaching Methodology) before her student teaching experiences, but had gained little understanding about practical teaching from her courseworks.

Elvina's first concept map

Using most of the theoretical understanding of practical teaching that she had from her first year, Elvina developed her first concept map at the beginning of the practicum phase. Elvina claimed;

Most of the theoretical knowledge, gained from my course enabled me to draw this map.

Elvina's first map has two main organisation concepts linked to 'effective teaching': 'teacher' and 'students'. Her first map consists of two primary (main

organisational) concepts and eight secondary (sub) concepts in three hierarchical levels.

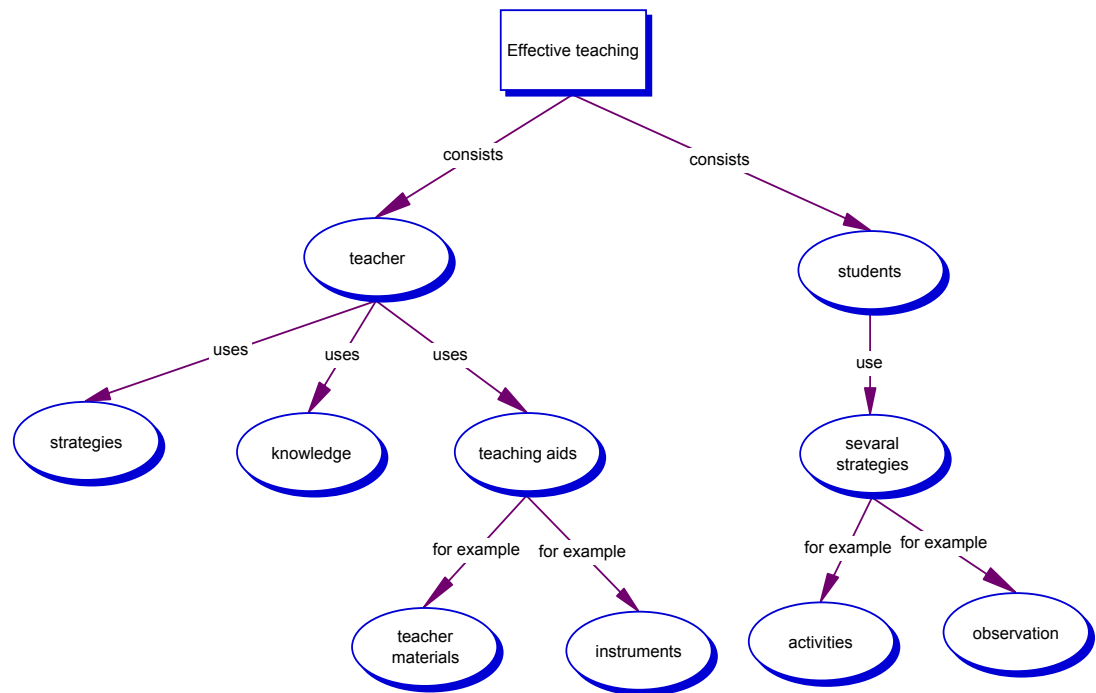


Figure 4.12. Elvina's first concept map

Under her first organisational concept the 'teacher', is linked through 'uses' to 'strategies', 'knowledge' and 'teaching aids'. Elvina considered relevant strategies to be important, so too teacher knowledge, although this is not clearly shown in this first concept map, that is there is no further development of these concepts.

The 'knowledge' concept is placed under 'teacher' because, *teachers must have good subject knowledge because they need to present facts clearly and directly*. It is interesting to note that Elvina was clear in her mind during the interview about what the concept of knowledge involved, but this also is not clearly shown on her first concept map.

'Teaching aids' is her third concept under 'teachers'. Examples of teaching aids provided in her first map are 'teacher materials' and 'instruments'. In her interview, Elvina stated that teaching aids such as materials and instruments

should be used to present the lesson because they can be used to evaluate students and as learning aids. Thus teachers use strategies, knowledge and teaching aids to make a good lesson.

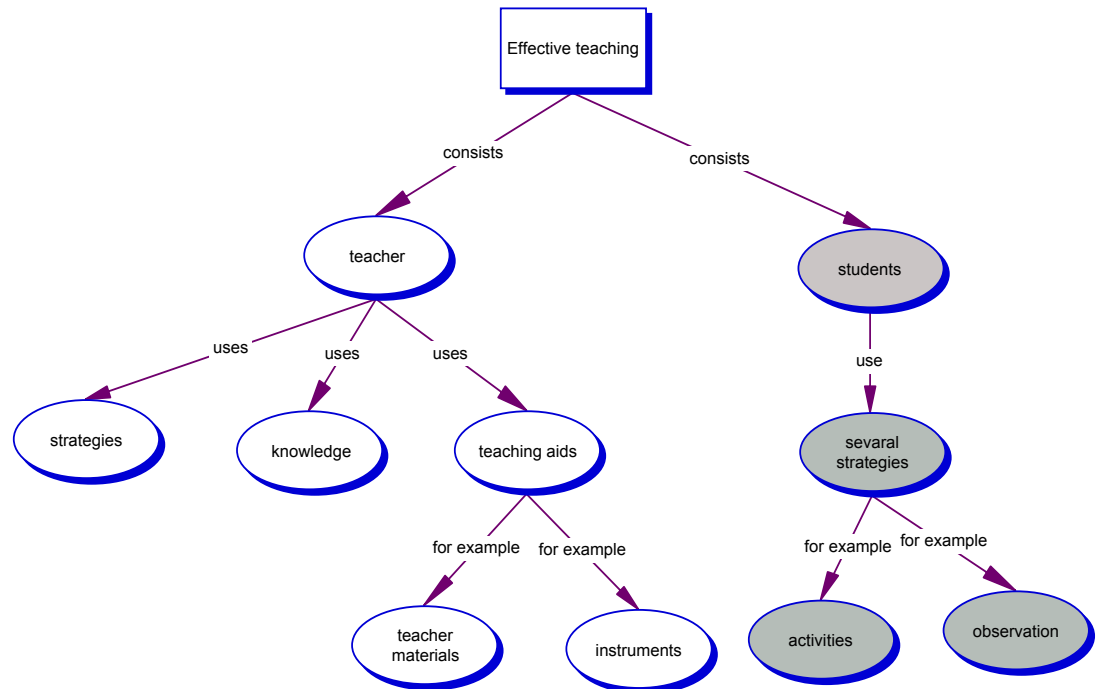


Figure 4.13. Development of the ‘students’ concept.

Beneath the second organisational concept of ‘students’ is the ‘multiple strategies’ concept which consists of ‘activities’ and ‘observation’. In her interview Elvina stated that students could use multiple strategies for learning to participate in learning activities as well as observation. Observation was claimed to be a good learning strategy to develop this skill and could assist the teaching-learning process.

Elvina’s second concept map.

Elvina developed her second concept map immediately after she completed the first phase of her practicum. According to Elvina, her practicum site was not well resourced or well disciplined. Besides a lack of resources, she also faced some negative attitudes from students and teachers about learning in her practicum. She spent more time solving student behavioural problems than

teaching. In her opinion, it was definitely not a co-operative practicum school, and this was later confirmed by her mentor teacher.

Even in this environment, her experienced and helpful mentor teacher, created more opportunities for her to improve her knowledge. However, when she attempted to implement them Elvina faced more and more difficulties, because of other teachers' negative attitudes and lack of support. However, with her mentor teacher's assistance and some students' support Elvina was able to implement and experiment with her new ideas, for which she was grateful. Elvina said:

Sometimes negative experiences and other teachers' attitudes were a challenge, forcing me to change my lesson and ideas. I regarded it as a good opportunity to learn and develop flexible teaching methods.

Elvina also said that she occasionally discussed those things with her mentor teacher and her supervisor lecturer, who guided her into improving her knowledge, and moreover, her students also helped her to develop new ideas.

From these experiences and the knowledge gained, Elvina developed a second map that consists of two primary (organisational) concepts, thirteen sub-concepts, fourteen relationships, two cross links and four hierarchical levels. Because her ideas had developed she adds two organisational concepts above 'teacher' and 'student': 'physical resources' and 'human resources'.

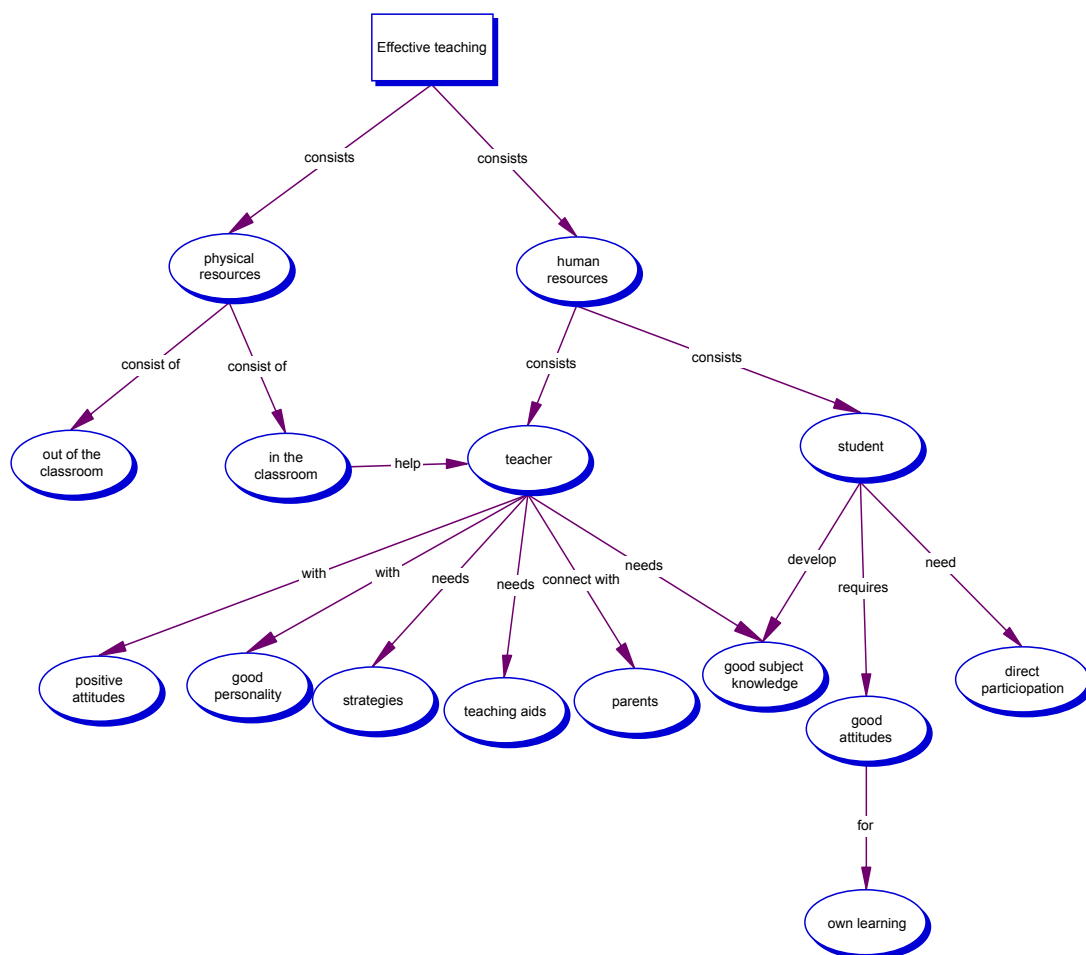


Figure 4. 14. Elvina's second concept map

The first organisational concept is 'physical resources', which includes those 'outside' and 'in the classroom'. In her interview, Elvina said:

Physical resources are important. For example, how can lessons be given without a blackboard and chalk.

Elvina also stated in her interview that:

With a good personality you can guide and control your students. I faced many behavioural problems in my practicum classroom but was able to control the students with my personal ability and attitude towards them. In my opinion every student can learn and develop if we guide them well.

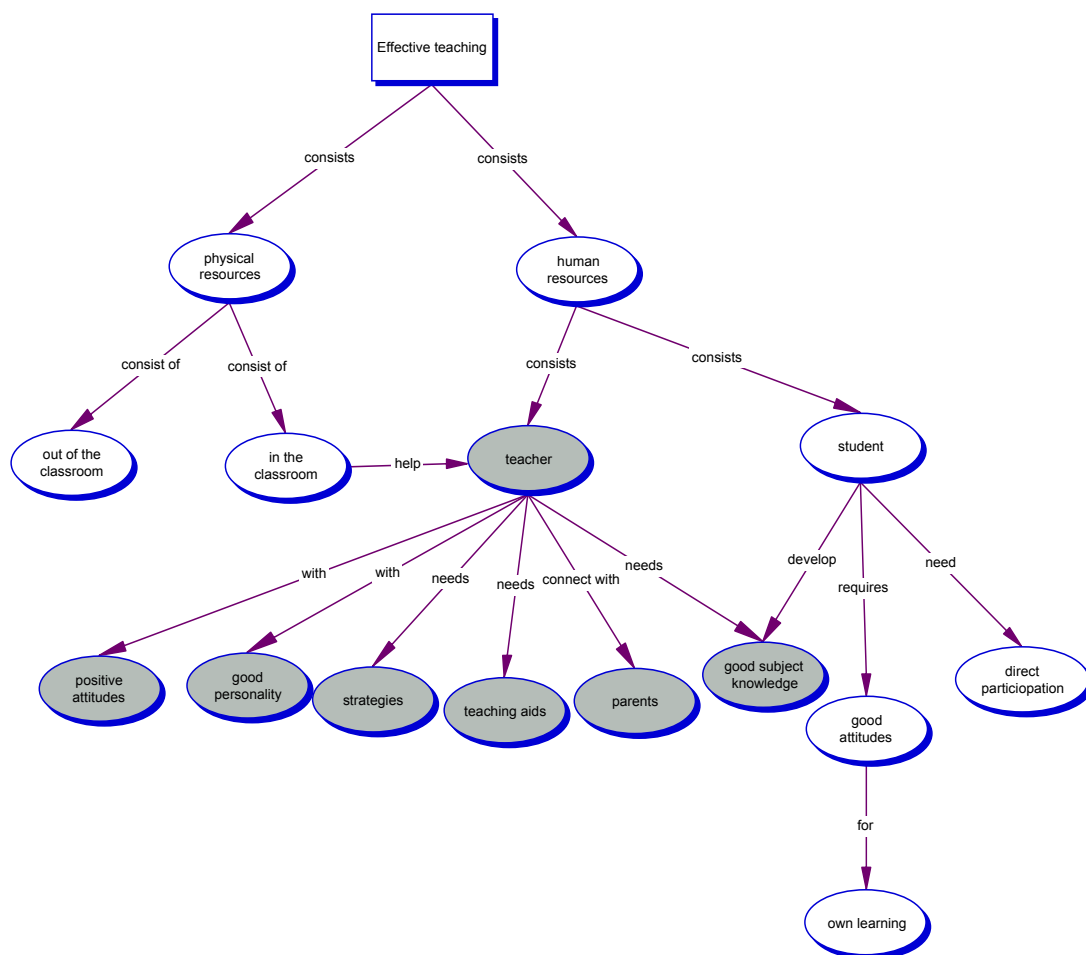


Figure 4.15. Development of ‘teacher’ concept

This was an interesting and important point in Elvina’s career because she had now realised and gained some professional understanding about practical teaching, which is why she developed the concept of ‘personality’ and ‘positive attitude’ under the ‘teacher’ sub-concept and added the ‘parents’ concept (see Figure 4.15). Mentioning the ‘parents’ concept she stated:

If you can develop a good relationship with parents, it will help you to manage and guide students’ learning.

About ‘teaching aids’, she said,

Using relevant teaching aids will help students understand the lesson.

In the second interview, Elvina explained that she still believed teachers need to know their subject, strategies and teaching aids, however they also need a

pleasant personality and attitude. Moreover, the teacher must connect with the students' parents in order to achieve effective teaching.

Under the 'student' concept are the concepts of 'direct participation' and 'good attitude'. According to her map, students with a good attitude to learning help teachers teach well.

Students need to make a contribution to their own learning, according to Elvina: *without students' participation you cannot maintain your class*. Elvina learned from experience how difficult teaching is while managing behavioral problems and exercising discipline, but when she was actually teaching she found it very interesting.

Another difficulty which Elvina faced was that sometimes students did not have a pencil or exercise book, which is why she included the concepts, 'direct participation' and 'good attitude' under the concept of 'students' in her second map. Students were also connected to 'subject knowledge' under 'teacher', because this can help students to learn. Overall, the second map developed the 'teacher' and 'student' concepts much more than the first map.

Elvina's third concept map.

Elvina developed the third concept map immediately after her practicum phases at the college. After the first practicum phase Elvina participated in two reflective sessions, which provided an opportunity to discuss and analyse her practicum site experience with colleagues and college lecturers. These opportunities helped Elvina to improve her knowledge, especially where she discussed the unpleasant experiences and tried to get solutions and the support of colleagues and lecturers. Elvina also claimed she tried to read several books and articles related to classroom practice, during and before the practicum period, which helped improve her knowledge.

Elvina's third concept map consists of fifteen concepts including two primary (main organisational) concepts, fourteen relationships, two cross-links, and

five hierarchical levels. It can be seen that there is much more development of her knowledge about teaching. The two main organisational concepts remain the same, ‘physical resources’ and ‘human resources’, but she develops more concepts under those and there is much more cross-linking of concepts which eventually focused on ‘a good lesson’ and then back to ‘learning’.

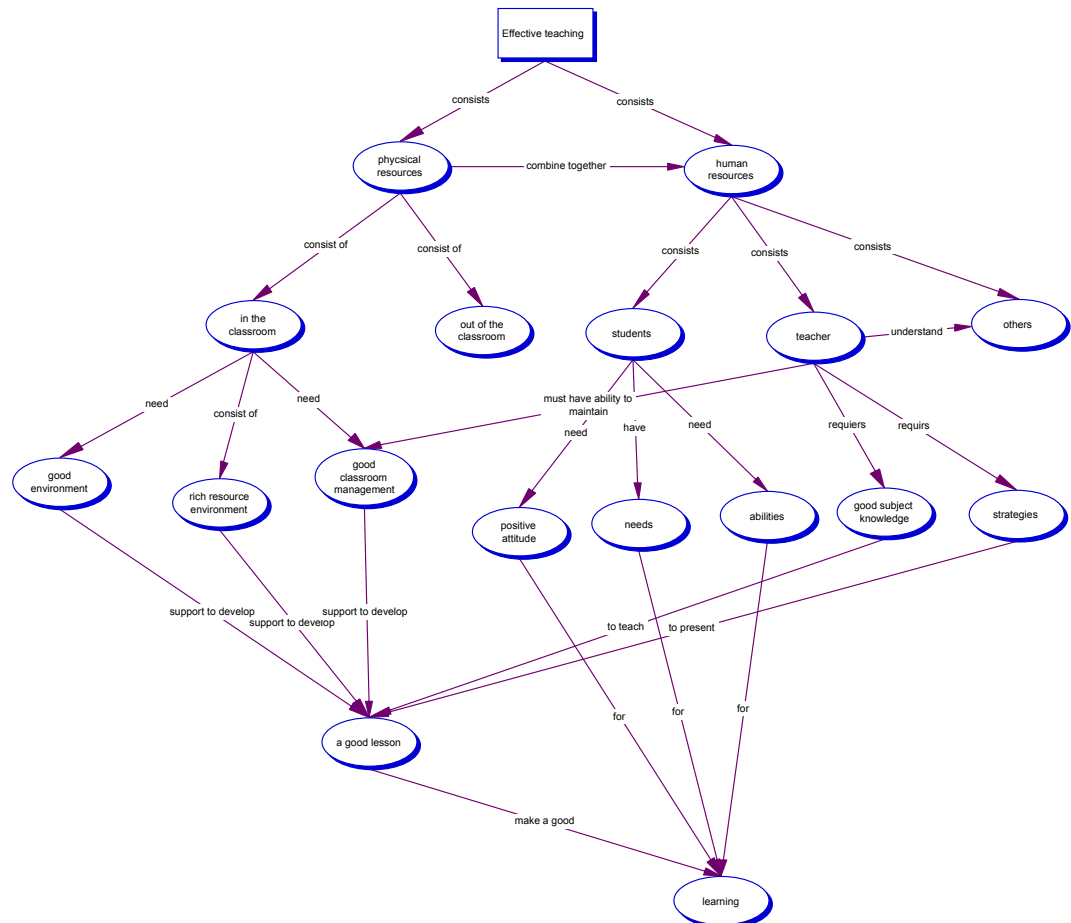


Figure 4.16. Elvina's third concept map

Under the ‘physical resources’ main concept, the resources ‘outside the classroom’ remains the same but resources ‘in the classroom’ are linked to ‘good environment’, ‘good classroom management’, and ‘rich resource environment’, all of which lead to the development of a good lesson. Also, ‘good classroom management’ is connected to ‘teachers’ because, as she stated in her third interview, student participation is a very important issue.

Under the second organisational concept, ‘human resource’, Elvina has again placed ‘students’ and ‘teacher’ but has also included ‘others’. Below the

‘students’ concept the ‘positive attitude’, ‘needs’ and ‘abilities’, which are all required for ‘learning’, which is also produced by ‘a good lesson’.

The ‘teachers’ concept is the most interesting feature of Elvina’s third map. Only two concepts remain in this cluster from the six in her second map. The two remaining concepts under ‘teacher’ are ‘good subject knowledge’ and ‘strategies’. According to her third interview effective teaching requires teachers to have good subject knowledge and good strategies. Teachers need good learning strategies and good teaching strategies that are relevant to their class, an idea that is not represented on her third map.

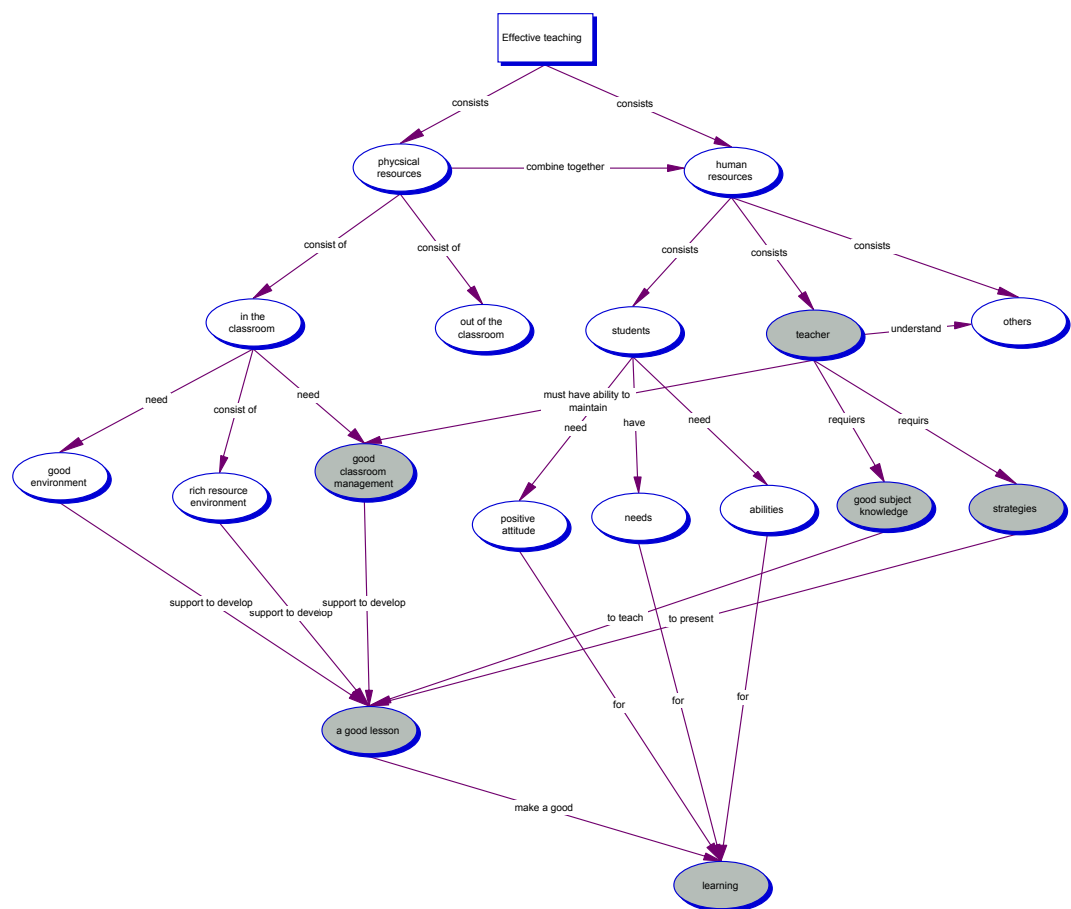


Figure 4.17. Development of ‘teacher’ concept

Developing effective learning and teaching strategies is a teacher’s responsibility according to Elvina, and she insisted that teachers should understand their responsibility otherwise they cannot conduct a successful lesson. The concept ‘teachers’ cross-linked to ‘good classroom management’

and then through ‘good subject knowledge’ and ‘strategies’ to a ‘good lesson’, because she claimed that within a well-managed classroom, teachers could teach their lesson easily. She also said in the interview classroom management requires good skills, but this is not shown on her map.

Under ‘human resources’ in her third map, Elvina adds a third concept: ‘others’. While this does not lead to other concepts on her map it was expanded and explained in detail in the third interview, where she said that ‘others’ included the ‘principal’, ‘other teachers’, and ‘parents’. *All these people affect your teaching*, Elvina claimed, so teachers must understand the roles of ‘others’ because they are also important. For example, *teachers can gain a lot of support from other teachers, parents, and the principal*.

Elvina acknowledged that there were many changes in her third concept map; in her previous maps most of the concepts, which had been separate are now linked together. She now realised that many of the concepts must be linked together because, *one would not work without the others*, and that these combinations result in effective teaching. She changed her ideas about effective teaching when she reflected on the practicum.

The main shift of this third map is that the two primary (main organisational) concepts are cross-linked together. Elvina now understood that these two concepts are very important for presenting a good lesson. In her interview she said, *you should combine physical and human resources together to present a good lesson*.

The second major shift is that Elvina developed more concepts related to ‘in the classroom resources’, all of which focus onto the development of ‘a good lesson’. In her interview, Elvina said that when she was teaching at the practicum site she faced many difficulties in how to manage students and others, as well as resources. Resources were scarce and most of the students had behavioural problems. After her reflecting on that type of environment she developed more sub-concepts under the ‘in the classroom’ concept.

The third major shift is in changes to the ‘teacher’ concept. At this stage Elvina reduced the number of concepts under the ‘teacher’ concept, which meant there are only three sub concepts instead of the six concepts in her second map. Elvina explained, *I believe the teacher’s attitudes and personality affect the classroom management as well as parents and teaching aids*. She further claimed this was the reason for including all these concepts under the ‘good classroom management’ concept, and why she deletes those concepts in her third map. Teachers’ sound subject knowledge and strategies are important to classroom management, she said, but these ideas are not clearly shown on her third map.

The fourth major shift involves changes to the ‘student’ concept. At this stage Elvina deleted the ‘direct participation’ concept and added two more concepts: ‘needs’ and ‘abilities’. All these concepts finally focus on the development of learning. From the position of Elvina’s new understanding now explores the development of student learning all the way through to a good lesson.

The final major shift is that most of the concepts under the clusters finally focus on the ‘good lesson’ concept which is in turn linked to ‘learning’ – that is, the outcome of a good lesson is good learning. She claimed that, *if you can create a good lesson, you are a good teacher*.

Summary of Elvina’s case

Elvina faced many problems in her practicum school because they did not have many facilities or resources, *sometimes not even a blackboard*. She found that the students did not care about learning because they thought they did not need to, therefore, when she was teaching she had to use any resources available and simultaneously control student behavioral problems. It was through these circumstances that she realised the difficulties a teacher often face as well as

the difficulties students could face. Her reflection on the practicum experience and the results of her observations are clearly shown in the third concept map, however it was clear from her interview that the lack of resources had a strong impact on the development of her concepts of what makes an effective teacher. Perhaps one of the more important discoveries was that, *I found that I have needed to be very flexible*. However, the most obvious overall shift was from the ‘teachers’ being the major concept along with ‘students’ to ‘human resources’ and ‘physical resources’ being the main organisational concepts for an effective lesson.

Sanjaya's case

Background

Sanjaya was a 24-year-old male student teacher enrolled in the mathematics teacher education course. Sanjaya reported that he had come from a popular high school, which was in the top level in the Education Ministry's school categorisation list. It was situated in a very populated town area, and was a well-resourced school. This school had maintained a good learning environment for a long period.

According to his comments, Sanjaya's parents were also teachers, and in his schooling time he had lived in school quarters with his parents. So, he was very familiar with the teaching profession, as well as the school environment. He commented:

I had many opportunities to identify the various aspects of the teaching profession because both my parents were teachers. I saw that they worked hard at their school; sometimes they prepared some teaching aids at home. It was a very interesting thing for me because at times they asked me to help them in their preparations.

Sanjaya's past background provided a very good basis for Sanjaya to understand the activities as well as strategies relevant to the teaching.

In addition, he had had some teaching experience as a private tuition master before he had enrolled in the teaching diploma course. When he was enrolled in private tuition he developed some teaching strategies by himself, and he had read several books related to the teaching profession before he entered the diploma course. He also received some instructions and guidance from his parents. He commented:

My parents were very good teachers. When I asked them something about my teaching they gave good instructions and guided me very well.

Sanjaya further mentioned that he gained more practical knowledge about teaching while he was studying his diploma coursework, and more theoretical knowledge about teaching from the professional subjects of his teaching diploma course such as Teaching as a Profession, Educational Practice, and Educational Psychology.

Sanjaya's first concept map.

Sanjaya constructed his first concept map at the college in a special seminar before participating in his student teaching. This map represented his thoughts about effective teaching in that time. Sanjaya's first map consists of nine concepts including two main concepts related to the topic, nine relationships, three levels of hierarchies, and three cross- links.

As Sanjaya's first map demonstrates, his opinion at first was that effective teaching consists of a combination of two major factors; 'theoretical teaching' and 'practical teaching'. This is evidenced by his comments: *I believe that effective teaching is fulfilled with a combination of theoretical and practical teaching.*

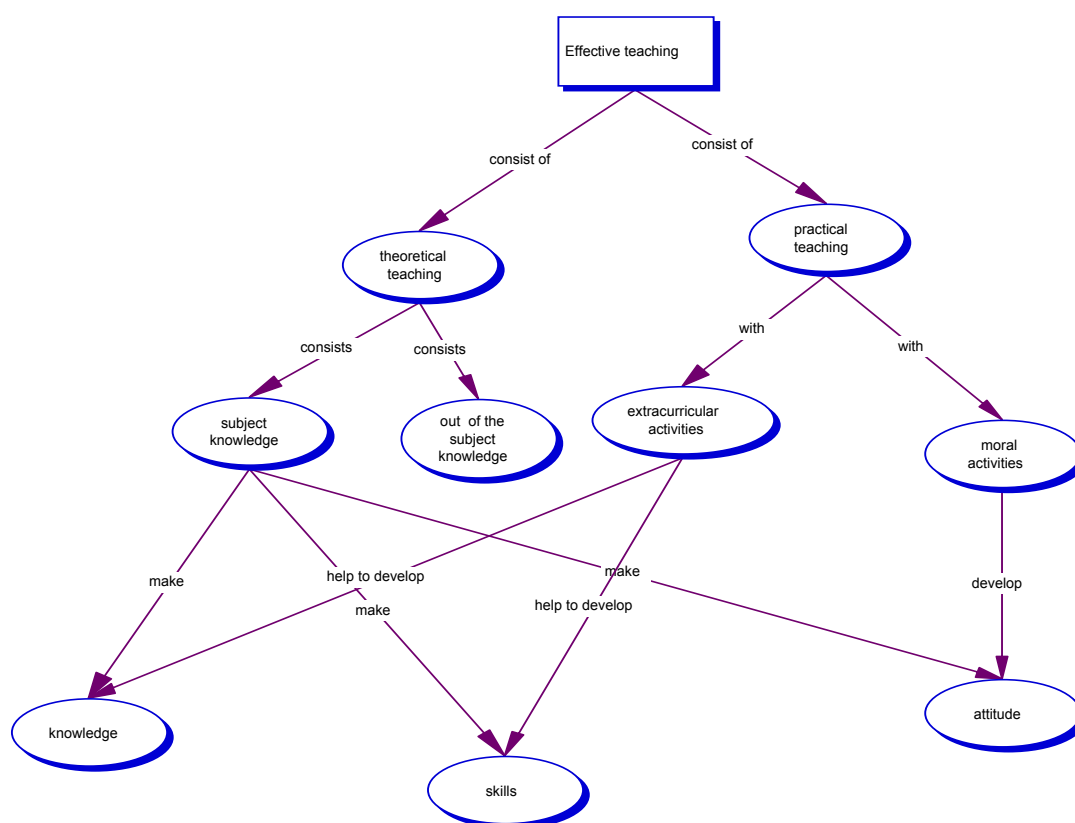


Figure 4.18. Sanjaya's first concept map

Under the first organisational concept of 'theoretical teaching' Sanjaya has placed concepts of 'subject knowledge' and 'out of the subject knowledge'. The first level sub-concept of subject knowledge has three other fourth-level sub-concepts: 'knowledge', 'skills' and 'attitude'. In his first interview, Sanjaya stated that, *subject knowledge provides good knowledge about the subject matter as well as skills and a positive attitude about the subject.*

Under the second organisational concept of 'practical teaching' he places two sub-concepts: 'extracurricular activities' and 'moral activities'. This 'extracurricular activities' sub-concept is also linked with 'knowledge' and 'skills' concepts under the concept of 'subject knowledge'. Another sub-concept, 'moral activities' is linked with 'attitudes'. According to Sanjaya, moral activities, extracurricular activities, and subject knowledge are required to provide students with knowledge, skills, as well as attitudes. In his first interview, Sanjaya said, *from your classroom activities, you should try to achieve some moral development of your students.* In addition he stated:

I believe that, by giving a combination of subject knowledge, general knowledge and practical knowledge, good teachers try to create a clear picture in their students' minds about the things that they are teaching.

This was his own view about his teaching. However, these ideas are not clearly seen in his first map. Sanjaya further explained that, *we should try to enrich our students' knowledge, attitudes, and skills through our lesson.*

In addition, when answering a question during the interview concerning the importance of theoretical and practical teaching, he stated that he considered both theoretical teaching and practical teaching as equally important for effective teaching. Sanjaya commented:

If you want to achieve effective teaching you should consider both theoretical and practical parts equally.

According to his description as well as the map, it seems that many of the comments and concepts drawn relied heavily on theoretical knowledge gained from his coursework and his previous practical experience.

Sanjaya's second concept map

As with the other participants in this study, Sanjaya drew his second concept map in the special seminar at the college immediately after the first phase of his practicum. Before developing his second map, his first map, drawn at the beginning of the practicum, was presented to him. The second map that Sanjaya developed was similar to his first map, but with some minor alterations.

Sanjaya's second concept map also consists of nine concepts related to the topic, nine relationships, three cross-links and three levels of hierarchies, which is the same as in his first map.

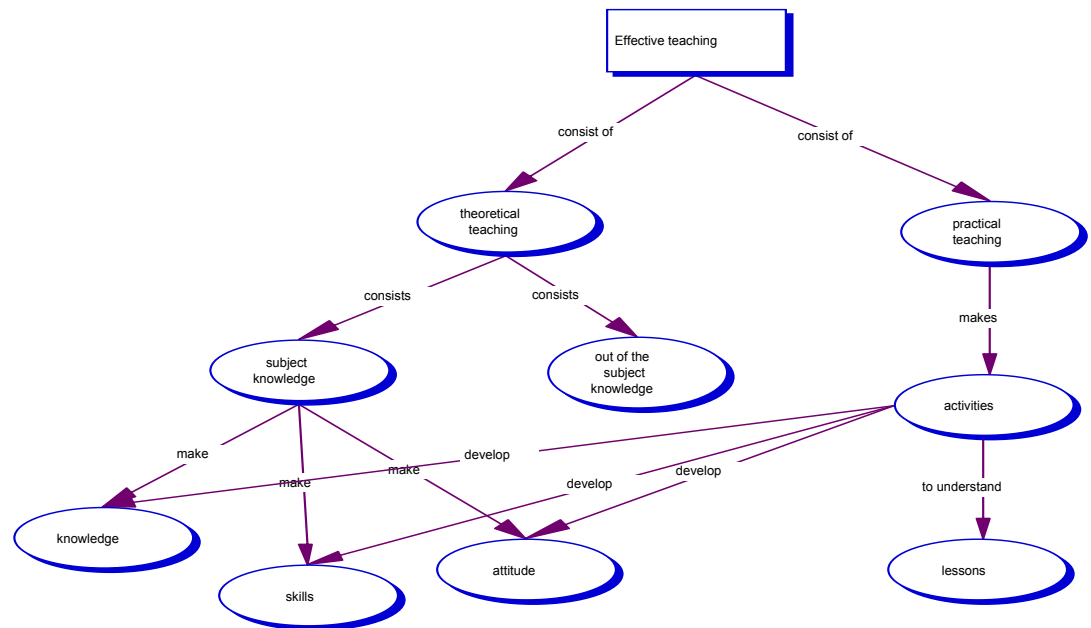


Figure 4.19. Sanjaya's second concept map

All the concepts under the first organisational concept of 'theoretical teaching' are the same as in his first map. However, some concepts under the second organisational concept of 'practical teaching' have changed. At this level, Sanjaya deleted the concept of 'moral activities' and 'extra curricular activities' and replaced them by the concept of 'activities', which links with the concept of, 'lessons'. This second map appears to indicate that activities are needed in order to understand the lesson. In his interview, Sanjaya commented:

Activities related to the teaching may help the student to understand the lesson. All these activities should be focused to develop students' understanding. Through these activities the teacher can develop students' knowledge, attitude and skills.

He further commented on the importance of activities by saying:

You should try to introduce more activities to your lesson, because, through these activities students more easily understand your lesson.

Sanjaya revealed in his interview that he believed that to achieve effective teaching the teacher should develop students' understanding about the subject as well as their general knowledge.

In addition, Sanjaya clearly explained the relationship between students' achievements and lesson aims:

If the teacher can achieve the lesson aims in their teaching process, then students can easily understand the lesson, and develop their learning.

However, this opinion of Sanjaya's is not clearly expressed in his second map.

In his interview, Sanjaya expressed his understanding of good teaching.

If teachers can give their students theoretical understanding as well as practical understanding of the subject, then good teaching could occur.

This statement is representative of his beliefs at the middle of the practicum period. An important point is that in Sanjaya's first concept map all his concepts generally relate to the teacher and none directly relate to the students. In his second map he includes some concepts relating to the teaching methods such as practical activities for students. For example, 'activities' can 'help' students understand the 'lesson'. A very interesting point is that Sanjaya's new understandings about students' learning and new concern for variation of teaching approaches are showed in his second map.

Indicating his new understanding about effective teaching, Sanjaya claimed that, *if the teachers could introduce several activities in their lesson then students could understand the lesson very easily.*

Sanjaya's third concept map.

After the first phase of his student teaching Sanjaya participated in two reflective workshops at his college. In these workshops, which were organised by the college, all student teachers exchanged their teaching practice experiences with other colleagues. Sanjaya also had the opportunity to participate in critical thinking sessions within these workshops. In these sessions he had been given opportunities to critically analyse and reflect on his student teaching experience in detail. Sanjaya discussed his ideas about teaching with other colleagues as well as his lecturers. According to Sanjaya this opportunity was very important for him as this process developed more ideas related to teaching. He commented: *It was really important and interesting. I was able to develop my knowledge about my teaching.*

In his second interview, Sanjaya pointed out the important point that within his first student teaching phase he had discussed several issues related to teaching with his mentor teacher. This was also revealed in informal discussions between the researcher and the mentor teacher. Sanjaya believed his mentor teacher to be a very experienced and excellent teacher. His mentor teacher claimed that Sanjaya was an enthusiastic student teacher who understood easily the concepts discussed. Sanjaya approached the second phase of his student teaching with this knowledge and experience gained from his first practical experience.

According to Sanjaya's interview, in the second part of his student teaching period he gained more understanding about teaching. This new broader understanding can be seen in his third concept map, which has many changes. At this stage, Sanjaya has changed his map structure, and the third map is

vastly different from his previous maps. Before developing his final map his previous two maps had been presented to him to view.

Sanjaya's third concept map has eleven sub-concepts under the four organisational concepts, fourteen relationships, seven cross-links, as well as four levels in the hierarchy.

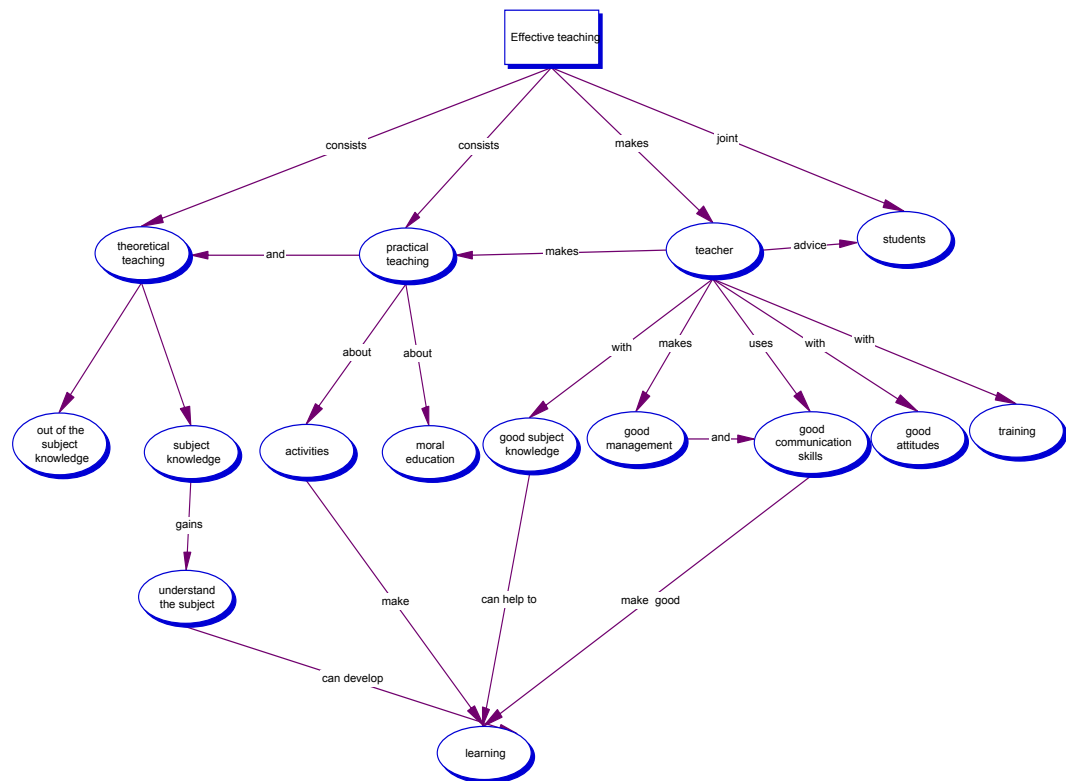


Figure 4.20. Sanjaya's third concept map

Sanjaya has now added two more organisational concepts: 'teacher' and 'students', in addition to his previous two organisational concepts. This is the major shift in his third map, and a very interesting and important point is that the four main organisational concepts are now linked. In his interview, Sanjaya explained why he had linked these concepts. According to his new understanding, he realised that many of the concepts related to teaching are inter-related. He explained the changes as, *all these concepts would work together in combination*.

Sanjaya further acknowledged that in his previous maps he had placed more concepts that were separate. He believed that this could be attributed to his previous theoretical understanding about teaching. However, now links among them were clear. The changes in his third map can be further understood through his comment:

After the practicum experience I understood some relationships between the concepts.

As Sanjaya's third map demonstrates, effective teaching consists of both 'theoretical teaching' and 'practical teaching', and these teaching concepts are connected to the teacher as well as joining with 'students'. It also shows that teachers are seen to provide practical and theoretical teaching and also advice to their students. In his interview, Sanjaya also explained this idea saying: *With the support of the students the teacher could achieve effective teaching.* He further explained these ideas as follows:

The meaning of good teaching is the simultaneous giving of theoretical knowledge and practical knowledge to the students by the teachers.

Another important major shift in his third map is that Sanjaya developed many more concepts under the first new main concept of 'teacher'. According to Sanjaya a 'teacher' with good 'subject knowledge', who makes 'good management' decisions, uses 'good communication skills', with a 'good attitude' and 'good training' will foster 'good learning' in students and be an effective teacher. There are five concepts under the concept of teacher: 'good subject knowledge', 'good classroom management', 'good communication skills', 'good attitudes', and 'training'. 'Teacher' is linked with three other main cluster concepts: 'theoretical teaching', 'practical teaching' and 'students'. It is evident that Sanjaya now realised that the teacher alone could not achieve effective teaching.

However, in his third interview, Sanjaya mentioned that, *'Teacher' is a main concept. It is very much more important than other concepts.* According to Sanjaya, good subject knowledge as well as good classroom management helps teachers to develop effective teaching, and effective communication skills and good attitudes help teachers to deal effectively with their students.

At this stage, Sanjaya placed the concept of 'training' under the 'teacher' concept. He had now seen 'training' as essential to develop the teacher's ability:

You know, what I mean is, good training gives the teacher good subject knowledge and good teaching skills. And through their good training the teachers develop good attitudes about their career.

Sanjaya also stated that he had added the concept of 'training' under 'teacher' because the teacher needs more experience in order to develop their professional teaching career.

In his interview Sanjaya mentioned another important point, that he had gained more experience of, and ideas about, teaching from his mentor teacher. According to him, most of the changes to his knowledge had been reorganised through his experiences, especially from observing his mentor teacher's classroom activities. As a result of this, there were many changes in his third concept map. Sanjaya also claimed:

Most of the changes I had made here I gained from my reflection. I observed my mentor teacher and her activities in the classroom. Especially, how she engaged with the students, how she presented the subject and how she acted in the classroom. Through all these things I realised how to achieve effective teaching.

These very important and interesting ideas can clearly be seen in his third map, where he had placed the concepts of ‘good management skills’, ‘good communication skills’ and ‘good attitudes’ under the ‘teacher’ concept. It is evident that Sanjaya’s practical experiences resulted in change to his knowledge, as well as to his ability to reflect on these experiences.

Sanjaya gained more knowledge about teaching from his mentor teacher because his mentor teacher was a ‘model’ to him. He believed, *she was an ideal teacher*. When he was teaching at his practicum site, he observed his mentor teacher and her relationship with students, and he developed more ideas about the concept of ‘teacher’ through his experiences. Sanjaya commented:

As I was gaining more and more experiences from my practicum, especially from my mentor teacher’s classroom, I realised what a teacher needs to do for good teaching.

The additional concepts added on his third map reveal Sanjaya’s greater understanding about the teacher’s role.

Another very important point was the development of ‘students’ concept. It is evident that Sanjaya had seen the role of students as important but at this stage as relatively simple.

However, most of the concepts under the organisational concepts finally focus onto the concept of ‘learning’. It seems that Sanjaya finally came to understand that student learning is an important factor in achieving effective teaching. His idea was supported by his interview description:

As teachers, we should try to develop student learning. That is why I linked all these concepts to the concept of student learning.

This statement as well as his third concept map reveals Sanjaya’s deeper understanding about teaching. Due to this new understanding he claimed that

good teaching means effective learning, which is supported by all the mapped relationships between learning and the sub-concepts of ‘understand the subject’, ‘activities’, ‘good subject knowledge’, and ‘good communication skills’.

Summary of the case

At the start of his practicum period Sanjaya presented all his concepts that related to effective teaching from only the teachers’ view. However, as he gained more and more real situation experiences, and upon reflection, Sanjaya had developed an understanding that effective teaching consisted of not only the teacher but also the students and other factors. He finally demonstrated that his concepts relating to effective teaching involved both students and teachers as well as resulting in effective teaching. Sanjaya’s opinion of effective teaching changed according to his practical experience, his reflection on his experience, and his observation of a model teacher.

Sanjaya finally concluded that for teaching to occur both the students and the teacher must have central roles and that many of the concepts involved in effective teaching will lead to learning when they are linked together.

Piyal’s case

Background

Piyal was a 24-year-old male student teacher, who was enrolled as a mathematics major. He came from a rural area, which had a lack of facilities such as difficult transportation. While studying at secondary school he experienced many difficulties, such as teacher shortage, lack of building facilities and inadequate learning resources.

A very interesting point from his interview, is that Piyal commented that the teachers who taught at his secondary school were neither professionals nor skilled. Facing those difficulties, Piyal managed to pass his advanced level examination, however, he did not receive adequate grades for entry and was unable to enrol in university courses. He decided to enter the colleges of education to become a good teacher. This was an interesting choice considering his own difficulties during secondary schooling. Piyal tried to achieve well throughout his course and worked hard to gain both theoretical and practical understanding and experiences of teaching; to become a good teacher.

Reflecting my schooling experience, I decided to be a good teacher to my students without giving them the difficulties that I faced during my schooling.

When Piyal started his student teaching period he had little teaching experience. Much of his understanding of teaching had come from his course experiences such as Microteaching, Classroom Observations and subjects such as Educational Psychology, Education Practice and Teaching as a Profession.

Piyal's first concept map

With this background Piyal participated in his first student teaching phase. Piyal developed his first concept map about teaching, just before beginning his

student teaching, in a special session at his college. His map represented his limited understanding and thoughts about teaching. Piyal commented:

I do not have much experience, but my theoretical knowledge, you know, that I gained from my course subjects and little practical knowledge helped me to draw this map.

Piyal's first concept map of effective teaching consists of three organisational concepts: 'theoretical knowledge', 'practical knowledge', and 'human resources'. It also has twelve sub-concepts, fifteen relationships, and three level hierarchies. There are no cross-links or connections between the main clusters in Piyal's first concept map of effective teaching.

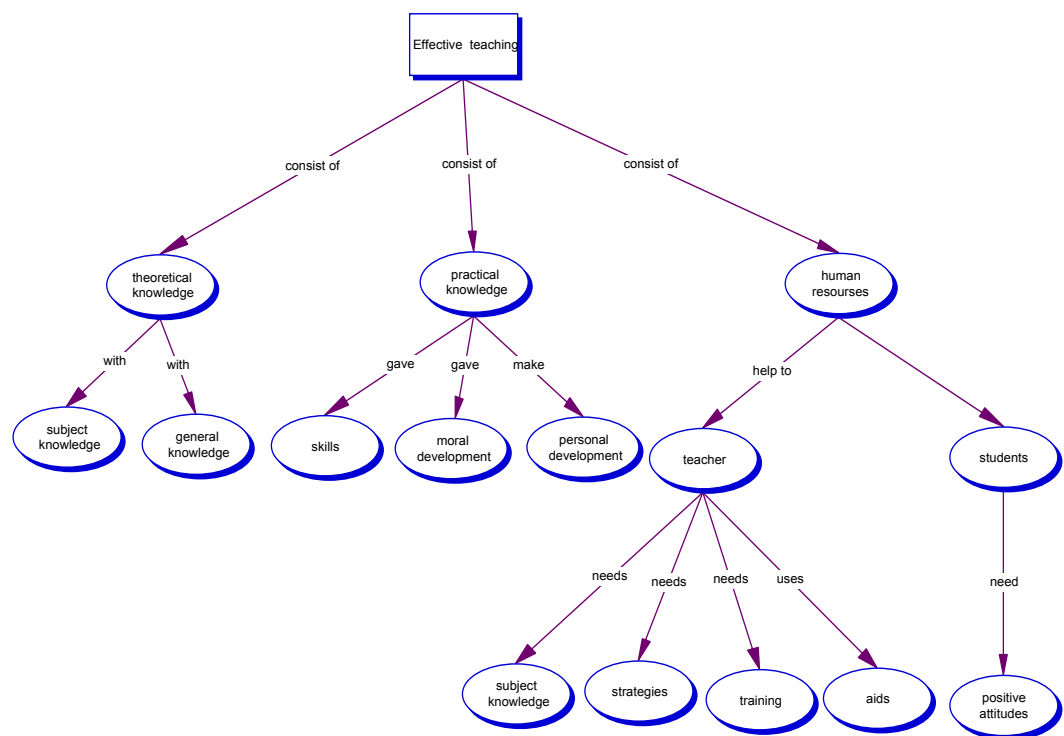


Figure 4.21. Piyal's first concept map

In his first concept map, Piyal has placed the first organisational concept of 'theoretical knowledge' with sub-concepts, 'subject knowledge' and 'general knowledge'. The second organisational concept of 'practical knowledge' includes teachers' 'skills', 'moral development', with 'personal development'.

The map also shows that the third main organisational concept, 'human resources' has two sub-concepts: 'teacher' and 'students'. Below 'teacher' are 'subject knowledge', 'strategies', 'training' and 'aids'. Below the 'students' concept he has drawn the sub-concept of 'positive attitudes'.

In Piyal's first interview he explained that, *the combination of theoretical knowledge, practical knowledge and human resources creates effective teaching.*

It is important to note that the theoretical knowledge section of this first map is very clear. By theoretical knowledge Piyal meant a combination of 'subject knowledge' and 'general knowledge'. In his first interview, Piyal stated that good teaching required good subject knowledge and so teachers must accumulate many facts about their subjects and also be enriched with all the factors relevant to their subjects. In addition, according to Piyal's comments, teachers need general knowledge as well as practical knowledge. Piyal claimed that general knowledge was about how to do classroom routine, practical work and how to use learning and teaching aids and classroom instruments. This notion was demonstrated by Piyal as follows:

They must have good general knowledge. This should be about day-to-day routines of the school, school environment, social knowledge, knowledge about community, and knowledge about common things, also teachers need practical knowledge.

He went on to say that through practical knowledge teachers influence the students' attitudes, skills, moral behavior and enhance their personal development overall.

Under the final organisational concept of 'human resources', Piyal placed two sub-concepts: 'teacher' and 'students'. When he was interviewed Piyal stated that, *human resources are very important for effective teaching.* Piyal claimed that resources included students, teachers, and others in the school that support teaching. However, this idea is not clearly shown on his concept map. As

Piyal's first map demonstrates he has drawn only the concepts of the 'students' and the 'teacher' under 'human resources'. When interviewed he did mention that it was the students and teachers who were most responsible for effective teaching because they played active roles in the classroom. Piyal claims:

You know, there are many issues related to the development of effective teaching. For example, teachers, students, and others in the school. Sometimes parents ... but teacher and students are the most important.

In addition, according to Piyal, the way to become an effective teacher was to have good training, as this was how subject knowledge and teaching strategies were developed. This may be another reason why he placed the concepts of 'subject knowledge', 'strategies', and 'aids' under the 'teacher' concept.

In his interview, he further mentioned that, *these factors improve teaching ability*. Moreover, for Piyal, relevant teaching and learning aids should be used for effective teaching. In addition, the students, needed to be ready for learning with good attitudes, so that a good lesson would be achieved.

However, it is important to note that some of these ideas mentioned in Piyal's interview are not clearly shown in his map. For example, according to his description, the teacher, students and others in the school are the people in human resources. However, he places only two concepts of 'students' and 'teacher' under the 'human resources' concept in his map. However, on examination, Piyal's second concept map is a clearer representation of his thoughts than his first map.

Piyal's second concept map.

Piyal constructed his second concept map in a special session at the college just after the first practicum. According to Piyal, he had a good practicum site, a good school with an effective principal and many experienced teachers. According to the school categorisation by the Ministry of Education in Sri

Lanka, Piyal's practicum site was a very popular 'Grade One' school. It had been richly resourced and had a good principal employed by the Ministry of Education. This factor is supported by Piyal's comments: *I was fortunate. I had a very helpful principal. He guided and advised me very well.*

Piyal claimed that his principal's guidance helped him to further develop his knowledge about teaching. In addition, Piyal gained many ideas from his mentor teacher, because she also was a very effective and experienced teacher. Piyal stated:

My mentor teacher's class was also really interesting. She managed everything well and asked me to observe her work which I have done. When I was teaching she supervised and gave some directions and guidance. Much of the time she did motivate me. It was an exciting and rewarding experience.

It is apparent that the knowledge and experience gained from his mentor teacher contributed to Piyal's reorganising of his knowledge about teaching.

A very interesting point was that there were discussions between Piyal, his mentor teacher and college supervisors about his teaching during his student teaching experience. These discussions provided additional opportunities for Piyal to reflect on and further develop his understanding about teaching. He further stated:

As a result of these discussions, I reflected on my teaching, and I tried to change my knowledge and behaviour in the classroom.

This situation enabled Piyal to gain some reliable instruction as well as providing an opportunity to reflect on the experiences from his first practicum. This may have helped Piyal to change and develop his map structure.

Before drawing his second map, Piyal's first concept map was placed before him. The second concept map consists of three main concepts, thirteen sub-

concepts, sixteen relationships, and four levels or hierarchies. The three main cluster concepts are: 'knowledge', 'teacher' and 'students'.

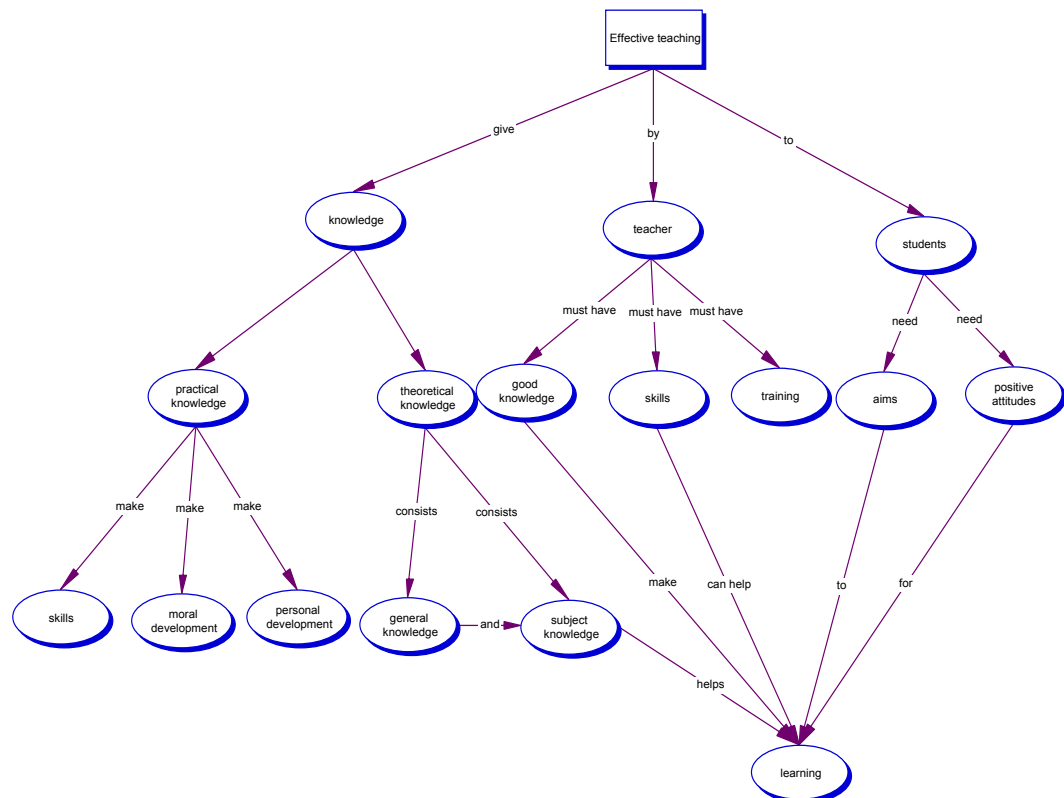


Figure 4.22. Piyal's second concepts map

In this second map, under the first organisational concept of 'knowledge' are two sub-concepts: 'practical knowledge' and 'theoretical knowledge', which Piyal had placed as main concepts in his first map. An interesting point was that the main concepts of his first map, 'theoretical knowledge' and 'practical knowledge' now come under the 'knowledge' organisational concept as second level sub-concepts. This is one of the major differences in his second map. At this stage, Piyal appears to have developed further his understanding about the concept of 'knowledge' because he identifies 'knowledge' as consisting of two concepts, separating 'knowledge' into 'theoretical' and 'practical' knowledge. The sub-concept, 'practical knowledge', had the same concepts below it as in his first map: 'skills', 'moral development' and 'personal development'. The concepts under 'theoretical knowledge' also remained unchanged: 'general knowledge' and 'subject knowledge'.

It is important to recognise another major shift in Piyal's understanding of theoretical knowledge. The sub-concepts here are joined with the terms 'consists' as well as 'and'. These concepts are now inter-connected. In summary, 'theoretical knowledge' consists of general and subject knowledge which both contribute to learning.

Another major shift in the second map are the shift of sub-concepts of 'students' and 'teacher' under the organisational concept of 'human resources' in his first map, to the position of organisational concepts, and the deletion of the 'human resources' concept (see Figure 4.23). In the second map, he identified these two concepts, 'teacher' and 'students', as being more important for effective teaching. In his second interview Piyal stated that *students and teachers are not only the resources. They are the main parts of good teaching, because without them you cannot finally focus on 'student learning'*. This appears to be a reflection of Piyal's deeper understanding about teaching.

The only concept under 'teacher' that remains constant in the second map is 'training'. Now it appears that teachers must have good knowledge, skills and training, but the type of training needed is not shown on Piyal's second map.

In his second interview Piyal explained why teachers must have good training for their teaching:

You know, a good teacher needs sound subject knowledge, good teaching and management skills. Through training and experience the teacher can develop these skills and knowledge.

According to this statement, Piyal's thoughts are very clear about the concept of 'teacher training', however this is not clearly shown in his map.

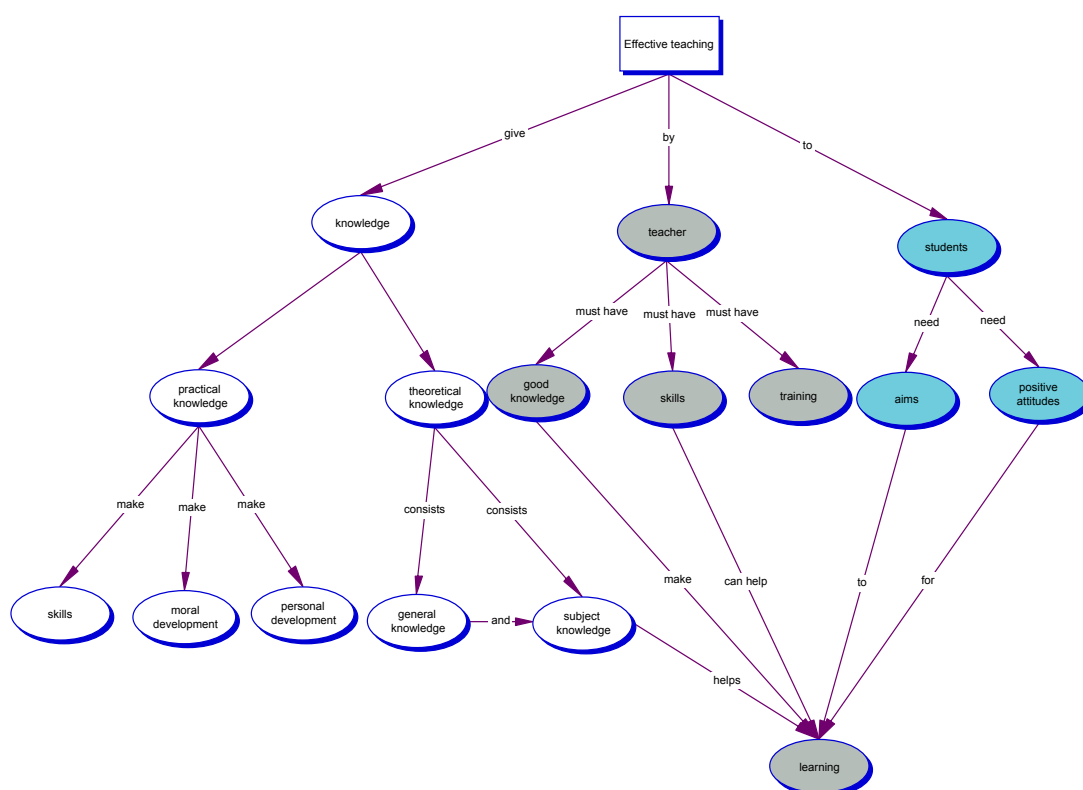


Figure 4.23. Development of the ‘teacher’ and ‘students’ concepts

Another major shift in Piya’s second map is that under the third organisational concept of ‘students’ he retained the concept of ‘positive attitudes’ and added the concept ‘aims’. Both ‘positive attitude’ and ‘aims’ are necessary for learning, according to his map. Therefore, at this level it appears that the teachers’ skills and training as well as the students’ aims and positive attitudes were seen as required to accomplish good learning.

According to his statements in his second interview Piya’s new teaching experience had caused him to change his previous ideas about effective teaching. Piya stated: *According to my new opinion effective teaching is the supply of good knowledge and skills to students by the teacher.*

According to Piya’s thoughts, when both the teacher and students actively participate in the class, then students gain knowledge through the lessons. He further stated that practical knowledge is very important because it can develop students’ personalities as well as their morality and skills. On the other hand,

theoretical knowledge develops subject matter as well as their general knowledge. These statements clearly show Piya's new broader understanding about teaching.

In Piya's interview, he also explained that good subject knowledge, good teaching and management skills were necessary to manage the classroom well. Piya believes, *otherwise, teachers cannot teach well*. An effective teacher can manage both their teaching and the classroom effectively at the same time, which leads to a good lesson, in Piya's opinion.

Piya also emphasised the students' part in the classroom for effective teaching. According to his opinion, the students need 'positive attitudes', and their 'aims' will help their learning: *If you have no aims you can't achieve your target. The same thing happens to students*.

Piya also stated that, *students must have a good attitude about their learning and also about teaching*. However, this is not clearly shown in his second map. Apparently, as stated, such attitudes will help to develop knowledge and learning. In his view, in a good lesson students are able to develop their personalities, skills and moral values.

Examining the changes in his concept maps as well as the depth of his interview responses there appears to be significant development in Piya's understanding appearing after completion of the first student teacher phase. At this point he realised that both teachers and students needed to be engaged in the lesson for effective teaching to be achieved. Therefore, the teacher and the students are both very important parts of effective teaching. Piya commented: *My opinion is that both teacher and students are very important for effective teaching, because their active participation in the lesson makes a good learning environment*.

According to his second map some concepts related to effective teaching are finally focused onto 'student learning'. It seems that this is now a reflection of

his deeper understanding about teaching. He reinforced that this was a very pivotal point in his teaching career.

Piyal's third concept map

Piyal constructed his third concept map immediately after his final student teacher phase during a special session provided at the college. Piyal's third concept map represents a new and broader understanding of effective teaching. His third map appears more complicated, especially concerning the concept of 'students'. To identify the reasons for these changes, it is necessary to see what was happening between the two practicum phases and examine his practical teaching school experiences.

After the first practicum phase Piyal participated in two reflective workshops and one problem-solving session at the college. In these seminars he had opportunities to discuss his practicum experience with his colleagues, and also to discuss the problems related to his teaching with colleagues, and also to discuss the problems related to his teaching with colleagues and college lecturers. Piyal stated that the sessions allowed him to reflect extensively on his own teaching. According to Piyal these opportunities assisted him in developing his understanding about teaching in relation to his practicum site experiences. He stated that, *My practicum site experience affected me to change my knowledge.*

In addition to these workshops and seminars, Piyal's mentor teacher, the principal and other experienced teachers at his practicum site expanded his knowledge about teaching. He further comments:

They tried to provide more and more understanding, when I asked them questions. Some teachers invited me to participate in their classroom activities. We made some teaching aids and learning aids together. We discussed some problems related to our teaching and students' learning. So, those things were very interesting. I received much from them.

According to this new understanding, he reorganised his previous map. Therefore, his third map represents a broader view of teaching. This map became much more complicated especially concerning the concept of ‘students’, as stated earlier. His third map has seventeen concepts including four organisational concepts, fifteen relationships, ten cross-links and six levels or hierarchies.

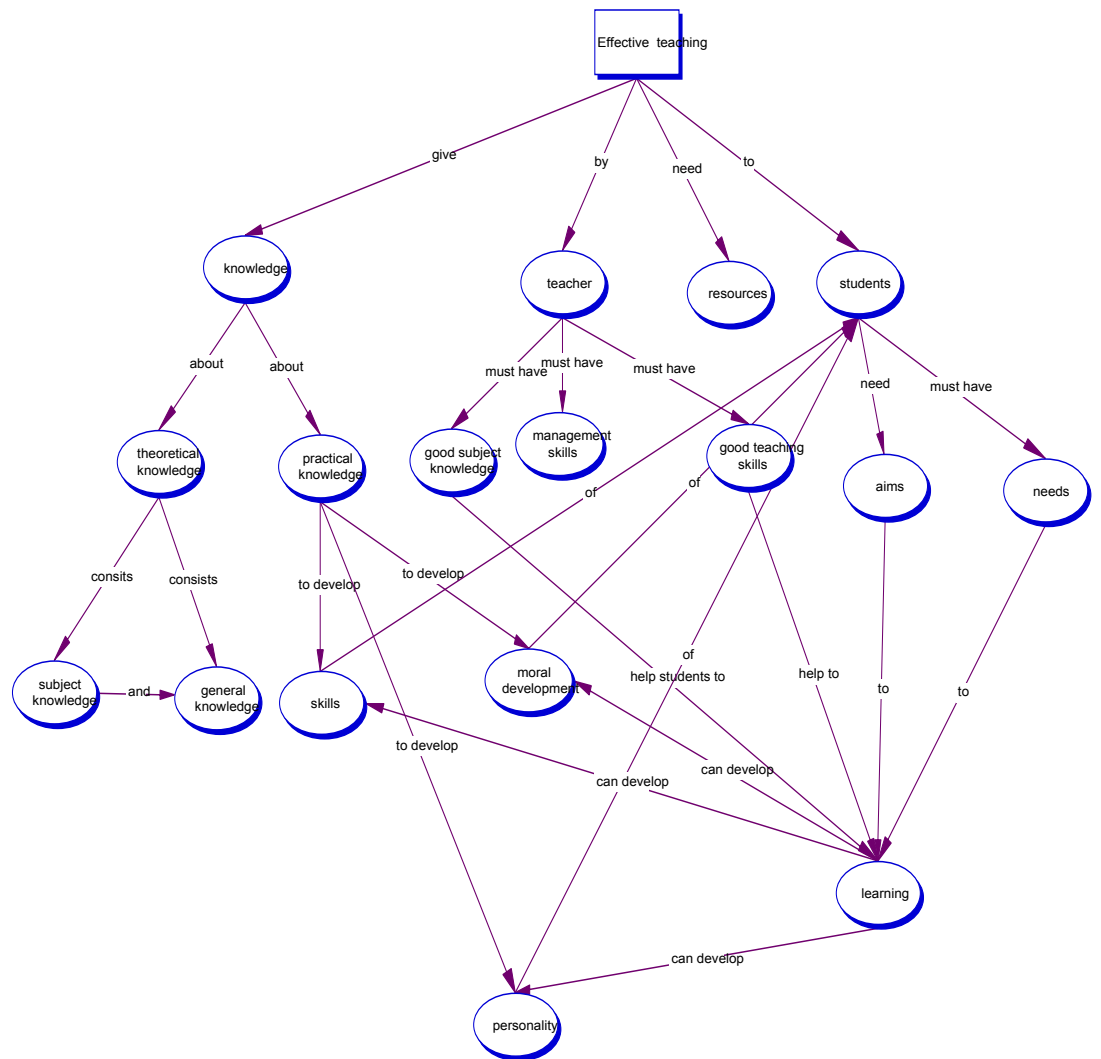


Figure 4.24. Piyal's third concept map

Now Piyal has four organisational concepts: ‘knowledge’, ‘teacher’, ‘resources’ and ‘students’. The concept of ‘resources’ is the new concept added in his third map. While other concepts in his third map are the same as in his second map, however, Piyal changed the map structure. In his third map, the concept of

‘learn’ is the bottom level concept as in his second map, however, the concept of ‘personality’ has been placed under the concept, ‘learn’. This is one of the major shifts in the third map. In his interview he explained why he now believed effective teaching consisted of these four main cluster concepts. Piyal stated that, *to give knowledge to their students, the teacher needs resources and the teacher requires good subject knowledge.*

Under the first organisational concept of ‘knowledge’ is ‘theoretical knowledge’, which consists of ‘subject knowledge’ and ‘general knowledge’ as in both previous maps. Under ‘practical knowledge’ are ‘moral development’ and ‘skills’ as before, and the previous concept of ‘personal development’ has become ‘personality’. However these three concepts are now cross-linked back to ‘students’. In his interview, describing the knowledge concept, he stated that knowledge consists of both theoretical knowledge and practical knowledge *because a good teacher needs to have knowledge about the subject being taught (theoretical knowledge) as well as practical skills to enable their students to understand and learn. Good teaching is not just teaching a subject, you want to teach for life.* This was the critical point in his thoughts.

By the time he drew his third map Piyal had further broadened his understanding of teaching. Piyal now believed through ‘theoretical knowledge’ teachers can provide ‘subject knowledge’ as well as ‘general knowledge’. In addition, through practical knowledge teachers should try to develop the students’ moral values, skills and personality. Piyal commented, *If you just teach your subject you can’t develop these things.* Therefore, he insisted that it is very important to provide both theoretical knowledge as well as practical knowledge. He confirmed that teaching for life means not just teaching subjects but also teaching students how to behave, how to practise knowledge and to evaluate experiences.

In the third map, the second organisational concept of ‘teacher’ is now linked to the concepts: ‘good subject knowledge’, ‘management skills’, and ‘good

teaching skills’. Both ‘good subject knowledge’ and ‘good teaching skills’ go on to connect to helping students to ‘learn’. ‘Learn’ is cross-linked back to ‘moral development’ and also linked with ‘personality’. According to the third map, learning can develop the students’ personality.

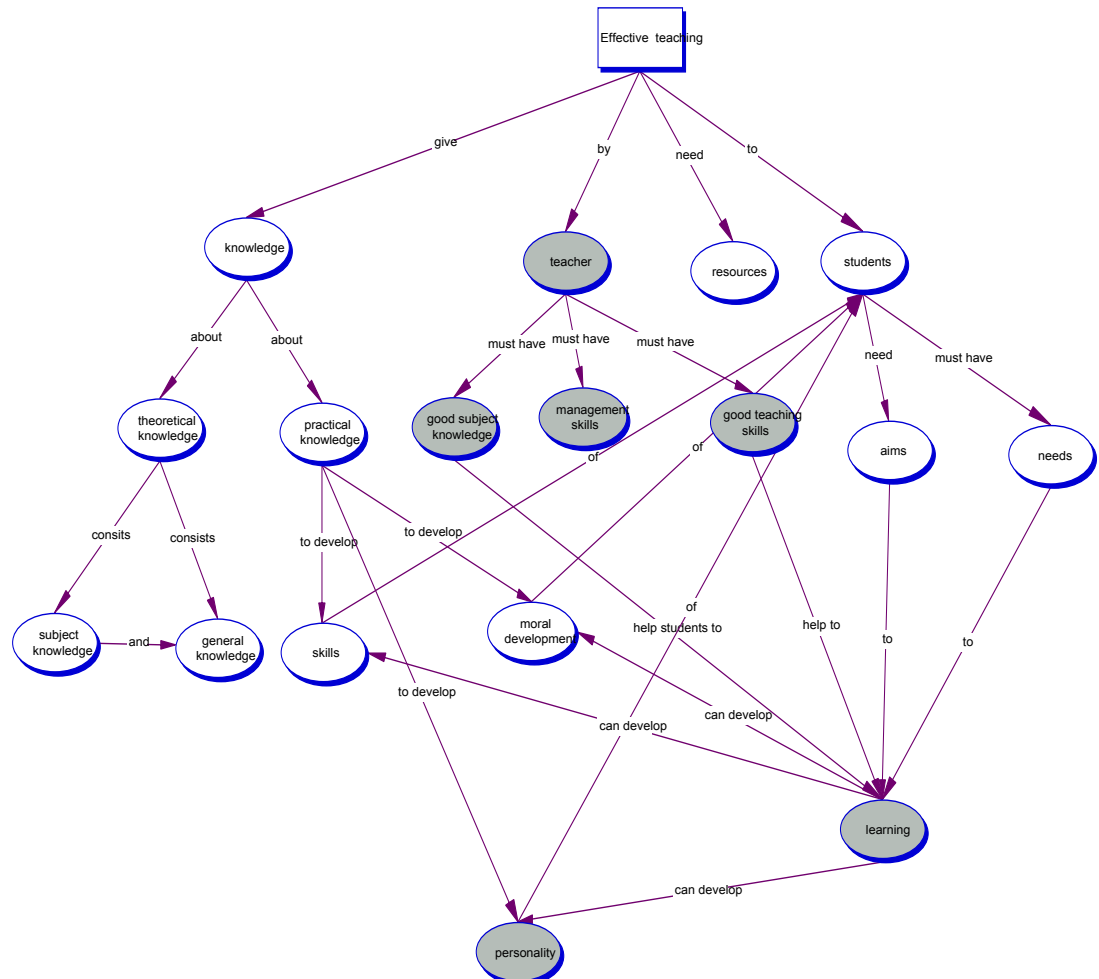


Figure 4.25. Development of the ‘teacher’ concept

In his interview Piyal explained that good teaching skills and management skills are required because teachers must have good management of the class:

For effective teaching you must manage your class well, and then use good teaching and learning skills. This is important because if you cannot control your class, you cannot present a good lesson.

A very interesting point is that his third organisational concept of ‘resources’ is not connected to any other concept in the third map, it is separate from all other

concepts and has no sub-concepts. According to this map, to accomplish effective teaching students and teachers need resources. Puyal identified the concept of 'resources' as an important issue for effective teaching. However, he did not link this with the other concepts of 'students' and 'teacher', which may demonstrate a limited view of the teaching process. However, in his interview Piyal commented:

Resources are very helpful to develop both teaching and learning, because without resources a teacher can't develop a good learning environment within his classroom.

Illustrating this idea he further commented:

Resources help teachers to demonstrate their teaching well, and develop their strategies, and it helps students to gain good understanding.

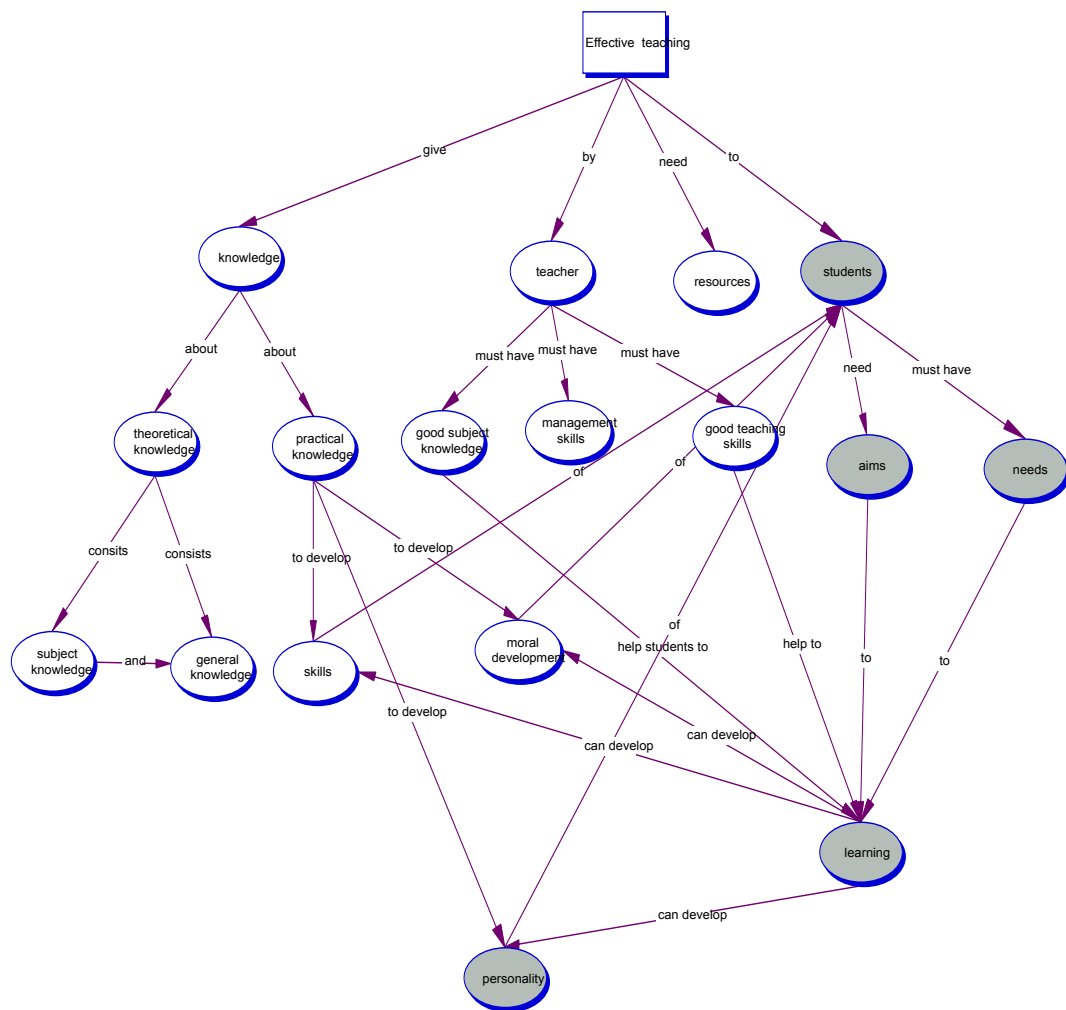


Figure 4.26. Development of the ‘students’ concept

One of the more interesting features of this third map is the development of the organisational concept of ‘students’ (see Figure 4.26). The concept ‘aims’ is under students as before, but now the concept ‘personality’ and ‘needs’ have also been added. ‘Aims’ and ‘needs’ are both connected to ‘learning’. The concept of ‘students’ is linked with ‘personality’, ‘moral development’, as well as ‘skills’. This is another major change in his thinking. In his interview Piya! stated that students must also know their needs and aims for learning. Then the teacher can develop their skills and moral character more easily. This is because students with relevant needs and aims are ready to learn and ready to develop more positive personality qualities. This change demonstrates Piya!’s broader view of the learner.

Another interesting point is that not only is the concept of 'students' more developed in Piya's third map but most of the concepts finally focus onto students' learning. At this level he makes many cross-links, which reveals that he had become aware of more relationships among the concepts in his third map. Piya's third map reflects a broader view of pedagogy within the school which is demonstrated by his use of terms such as management skills, teaching skills, and theoretical knowledge.

A very important point is that Piya's third map is different because he finally realised what good teaching is through his practicum experience. He commented:

While getting practical experience I reorganised my ideas about teaching. So, when you are teaching you should be concerned with all these things... Lots of my student teaching experiences affected my changes.

Summary of the Piya's case.

When comparing Piya's maps, many more changes are evident as they developed. He insisted that his student teaching experiences affected his view of teaching very much and that the experienced teachers at his practicum site greatly helped him to develop his ideas about effective teaching. According to Piya, his student teaching experience, especially with his mentor teacher, influenced him to change his ideas and understand the relationships among concepts. Piya's reflection on his student teaching site experiences, especially on his engagement with his mentor teacher, the students and others in the school, as well as the students' activities, and school environment, had all influenced these changes in his ideas about what constitutes effective teaching.

Summary of cases

- Overall, Shamalie's knowledge had become very complex, which is clearly shown in her final map. For her, learning and providing good learning experiences for her students and the connection between the two are now essential goals for effective teaching.
- For Kumar 'quality learning' and 'quality teaching' have the greatest influence on how to present effective teaching. Therefore, Kumar finally became focused directly on both improving and understanding teaching as well as learning.
- In Elvina's case the difficulties a teacher can face were highlighted. Accordingly, she now believes that the teacher needs to be very flexible. The most obvious overall change in her opinion of what made effective teaching was a shift from the 'teacher' being the major concept along with 'students', to 'resources' being the main organisational concept necessary to achieve an effective lesson and facilitating learning.
- In Sanjaya's case the overall shift was from a focus only on concepts related to the teacher's view, to eventually including 'students' and 'others'.
- Finally, Piyal also changed his concepts in accordance with his practicum experiences. He now understands that there are many more relationships than he first thought among the concepts involved in effective teaching.

Summary of the chapter

Chapter Four has been presented in two parts: 1). The Sri Lankan context of teacher education, 2) the five case studies of mathematics teaching students. In part one the pre-service teacher preparation context in Sri Lanka had been introduced, and an overview of what the participants brought to the study. Generally, in part two, across all mathematics students, it may be concluded that practical experiences of student teaching influenced many of the changes in their views and opinions about what effective teaching is. The next chapter will present the case studies about other five student teachers with a science major, and an overall summary of the case studies will also be provided in Chapter Five.

Chapter Five

Results of the study – student teachers with Science major

Introduction

Chapter Five presents the further five case studies of pre-service teachers with a science major. These are the case studies of Malie, Anura, Sarath, Nirmala, and Malanie. As with the mathematics teachers' case studies, each case study combines the data from all three maps the data gained from the three interviews.

Case studies of science student teachers

Malie's case

Background

Malie was a 23-year-old female novice science student teacher who was motivated by high expectations concerning a teaching career. At the time of the research study Malie had little prior experience of teaching, including limited microteaching, model teaching and classroom observations. It appears that Malie derived most of her theoretical knowledge and methodology about teaching from subjects in her teaching diploma course and her personal experience during her own schooling.

Prior to entering the college Malie was employed as a social worker after she completed her secondary education at the school. She had worked in a rural area and was engaged with school students as part of her social work.

According to Malie, she had good understanding of, and relationships, with school children before entering the college. After entering teaching Malie claimed that she tried to be a good teacher by reading more books relevant to the teaching profession.

Malie's first concept map

Malie's first concept map was completed before participating in her practicum. Like the other student teachers who participated in this study Malie's map represented her existing knowledge about teaching. Malie's first concept map explaining effective teaching has two main or organisational concepts: 'students' and 'teacher'. According to this initial map effective teaching could be described by only a limited number of concepts. It appears on examination that the activities conceptualised by Malie in relation to effective teaching were limited to the classroom, and that the teacher had the main role in effective teaching. This map has twelve concepts, twelve relationships, one cross-link and three levels or hierarchies. All the sub-concepts have been structured under the organisational concepts of 'students' and 'teacher'.

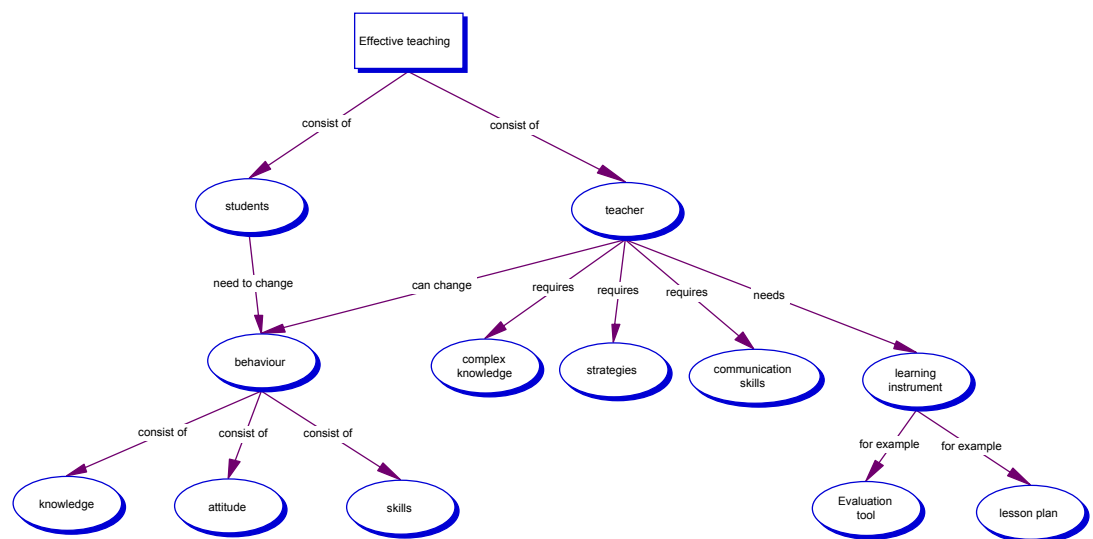


Figure 5.1 Malie's first map

Under the first organisational concept, 'students', is the concept of 'behaviour,' which 'consists' of 'knowledge', 'attitude' and 'skills'. Under the 'teacher' cluster Malie shows that the teacher requires 'complex knowledge', 'strategies'

and ‘communication skills’, and that the teacher needs teaching instruments, such as an ‘evaluation tool’ and a ‘lesson plan’.

Malie’s first concept map demonstrates that she understands effective teaching as involving the teacher changing the student’s behaviour. Her concept of ‘behaviour’ includes the students’ attitudes, knowledge and skills, changes in which would result in changed behaviour.

It is noteworthy that in Malie’s first interview, she claimed that knowledge about students, about their learning, and about the subject were very important for effective teaching:

You know, if you have sharp knowledge about your student and their learning it affects you to present good teaching. In addition to these you need to master your subject.

However, this idea was not demonstrated in her map. It appears that the interviews combined with the concept maps allowed the participants to expand their thoughts and understandings in more detail.

Malie stated that an effective teacher needs to have good communication with her students. Good communication was claimed by Malie to be very helpful for conducting classes and student learning. She said that she believed that an effective teacher generally used relevant learning and teaching methods, which supported her claims that teachers must have good skills.

In relation to the students, Malie believed that their role in effective teaching was to participate fully; That is, participation by students will result in behaviour change. Again, however, this idea is not evident in her first concept map.

Malie’s second concept map.

Malie's second concept map of effective teaching was constructed in the middle of the student teaching period, and drawn just after completion of her first practicum phase, and after receiving her first map. Malie's practicum site was a very good school, which maintained good disciplinary and learning environments, and had the reputation of having a very good principal. She described the children who were studying at that school as being interested in learning. So, she had a good opportunity to develop her knowledge about teaching in a positive school environment.

Malie's second concept map is a little more complex, consisting of fourteen concepts, fifteen relationships, one cross-link, and four levels or hierarchies. This map includes two main or organisational concepts, 'teacher' and 'students', as in her first concept map. However, some interesting features can be seen in her second concept map, for example, the connecting arrow directly from 'teacher' to 'students'.

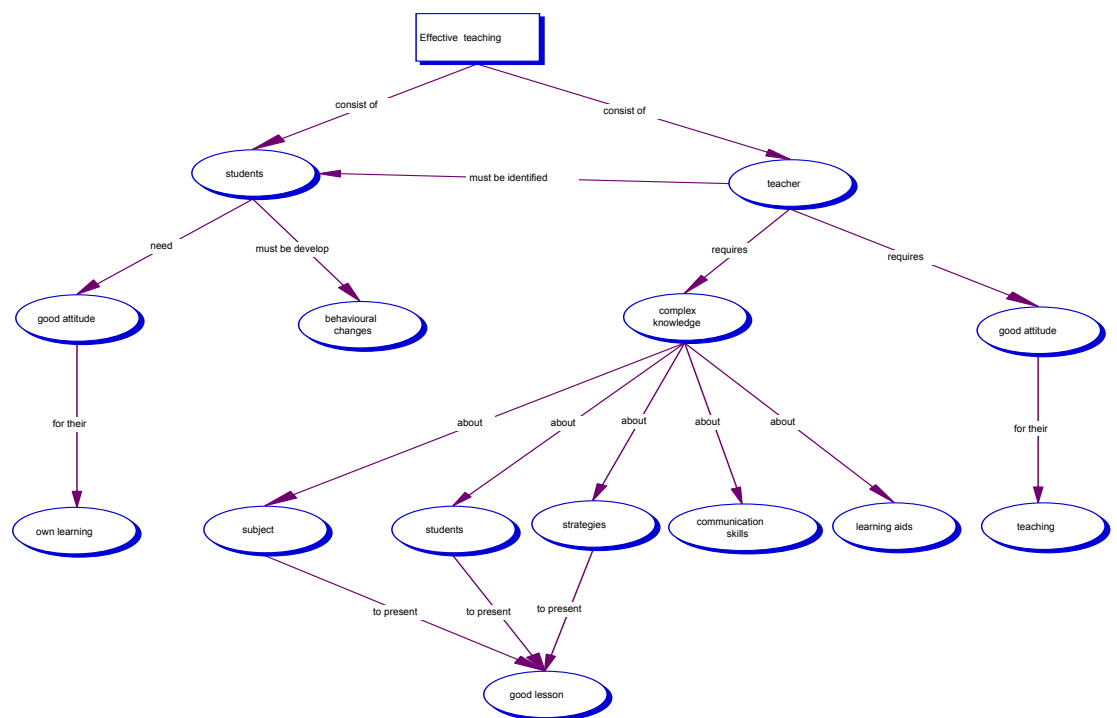


Figure 5.2 Malie's second concept map

In her first map, the concepts under the organisational concepts of 'students' and 'teacher' were separate. However, in her second concept map, there are some connections, and many of the concepts under the main concept of

‘teacher’ finally focus onto ‘good lesson’. The concept of ‘good lesson’ is represented as the fourth level in the hierarchy. At this stage Malie’s idea was that the teacher equipped with a number of skills would eventually produce a good lesson.

In her first map the connecting arrow went from teacher to behaviour, which indicated that Malie believed that teachers could change students’ behaviour. The change in the second map, where ‘teachers’ and ‘students’ are connected through ‘*identification*’ suggests that teachers need to focus on their relationship with students rather than directly on their behaviour.

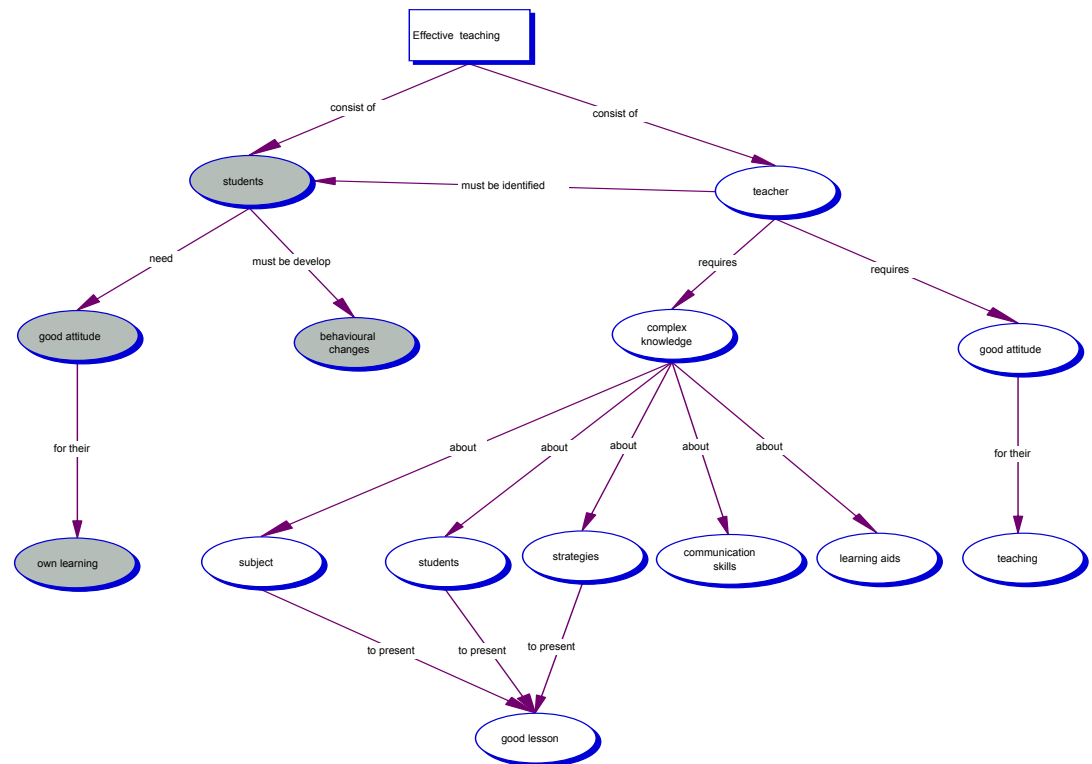


Figure 5.3 Development of the ‘students’ concept

In the second map, under the first organisational concept ‘student’ are the concepts of ‘good attitudes’ and ‘behavioural changes’ (see Figure 5.3). According to Malie’s interpretation of her map in her interview, she believed that students need good attitudes toward their own learning and that they must develop behavioural changes through effective teaching. Malie claimed:

Not only your attitudes. Students must also have good attitudes about their learning. So, then you can do your role well, and the students can develop their behaviour through your teaching.

The ‘student’ organisational concept also links to the ‘teacher’ organisational concept. When interviewed, Malie stated that the teacher must be able to identify student learning needs to enable effective teaching. In her second concept map, she has added four more concepts than in her first concept map. This could be attributed to the development of her knowledge as a result of the practice teaching experiences.

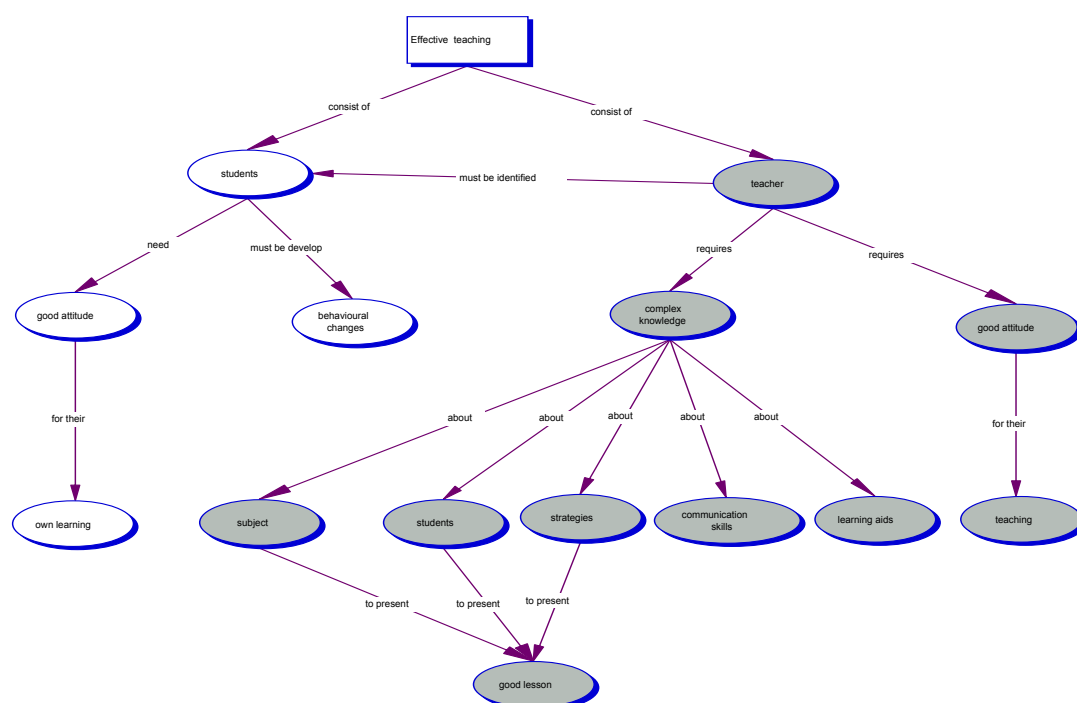


Figure 5.4 Development of the ‘teacher’ concept

Under the second organisational concept, ‘teacher’, are the concepts of ‘complex knowledge’ and ‘good attitude’ (see Figure 5.4). Malie’s second map becomes more complex, demonstrating a broader view of teacher knowledge and showing that the teacher requires complex knowledge about the subject, students, strategies, communication skills and learning aids, in order to present a good lesson. The notion of the good lesson has clearly become important to Malie, as shown in her second concept map. It is important to note that Malie

has moved the concept of 'complex knowledge' to become an important sub-concept with five lower-level sub-concepts derived from it. In her first map 'complex knowledge' sat at the same level as 'strategies' and 'communication skills'; in her second map it becomes the organisational concept.

Malie's second map changes in relation to knowledge, which indicates that she now believed the teacher required more knowledge about concepts such as students and lessons. Her map suggests that at this point she was much more definite that a good lesson is a main goal of effective teaching while demonstrating that it was a much more complex process. This point is interesting because it indicates that the practicum experience has helped her to broaden the focus of effective teaching to strengthen the students' own learning, teaching, and lesson presentation: *If you can develop students' learning from your lesson, that is the good lesson.*

According to Malie, teachers also require a good attitude for their teaching: *You know teachers must have good attitudes for their teaching. Otherwise they can't do good teaching.*

In the second interview with Malie, she explained that effective teaching incorporates two major concepts and those concepts are 'teacher' and 'students'. According to Malie, on one hand the students' role in effective teaching is to participate fully and also bring to it a good attitude and willingness to change their behaviour: *They must have a good attitude about their learning, and they must be ready to change their behavior while getting their learning.*

On the other hand, the teacher requires complex knowledge and a positive attitude toward their teaching. Malie argued in her interview that the teacher needs complex knowledge about students and their learning to identify each student's situation and provide a good learning environment for them through using relevant teaching and learning styles. She claimed that the teacher needs to select appropriate teaching and learning strategies and learning aids: *They*

want to know about their students and their learning styles... Due to the students' learning styles you should use different teaching styles.

According to Malie the teacher also needs good communication skills to communicate effectively with different types of students.

Malie's broader view of the roles of the teacher may be attributed to her experience in the real classroom and school environment. It appears that Malie had reflected deeply about her teaching, due to this experience.

Malie's third concept map

After the completion of her first practicum phase Malie participated in three reflective sessions and workshops at her college. In those workshops Malie had opportunities to explore her ideas about her practicum experience and teaching. Her college lecturers and other colleagues were available to help Malie develop her ideas. These workshops provided opportunities to discuss, and reflect on their experiences with others, and the student teachers were asked to try to implement the new ideas that they had gained from the workshops during their second student teaching phase. Malie arranged to implement her new ideas at the second phase of the student teaching, and she had also made more time for discussion with her mentor teacher about teaching. Moreover, Malie had arranged to observe other experienced teachers' classes. In the second phase of her student teaching she was more instructed and directed by her mentor teacher as well as by the college lecturers.

Immediately after she finished her second phase of student teaching, Malie drew her third concept map. It is rather different and even more complex than her previous maps. Malie's third concept map has twenty-two concepts related to the topic of effective teaching, twenty-seven relationships, one cross-link and five levels or hierarchies.

Malie's third concept map consists of three organisational concepts: 'students', 'teacher', and 'others'. This third concept map is very interesting because it reveals a major shift among factors which may impact on being an

effective teacher. Here she adds one new major organisational concept: 'others'. All the concepts under the organisational concepts of 'teacher' and 'students' are finally linked together, showing that all the efforts of both students and teacher are seen to be required to develop a good lesson.

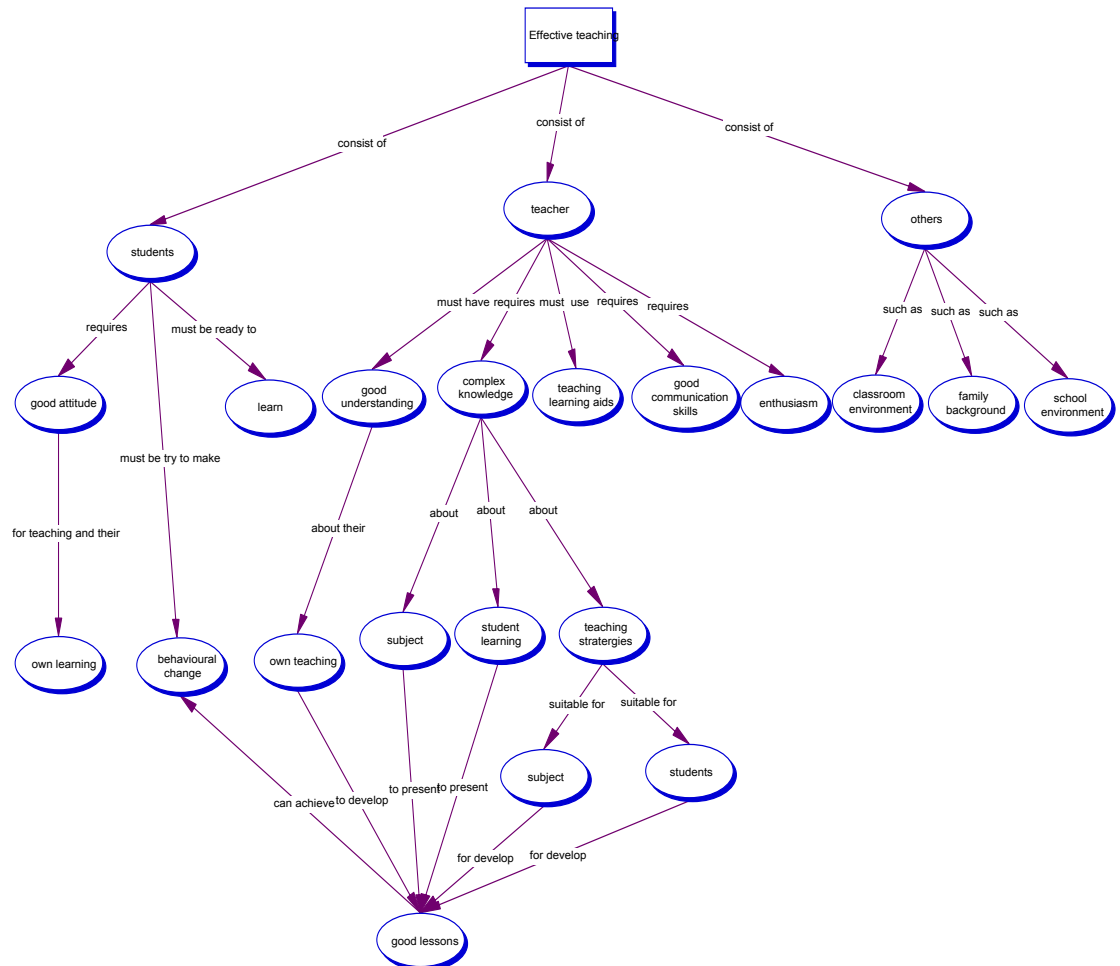


Figure 5.5 Malie's third concept map

Under the first organisational concept of 'students' is one more concept: 'learn'. According to Malie, students require a good attitude for teaching and their own learning, and they must be ready to learn. In a good lesson, students must try to make behavioral changes. Malie further explained that students must be ready to learn and they should be enthusiastic about their learning.

Students must also be ready to change their behaviours through effective teaching.

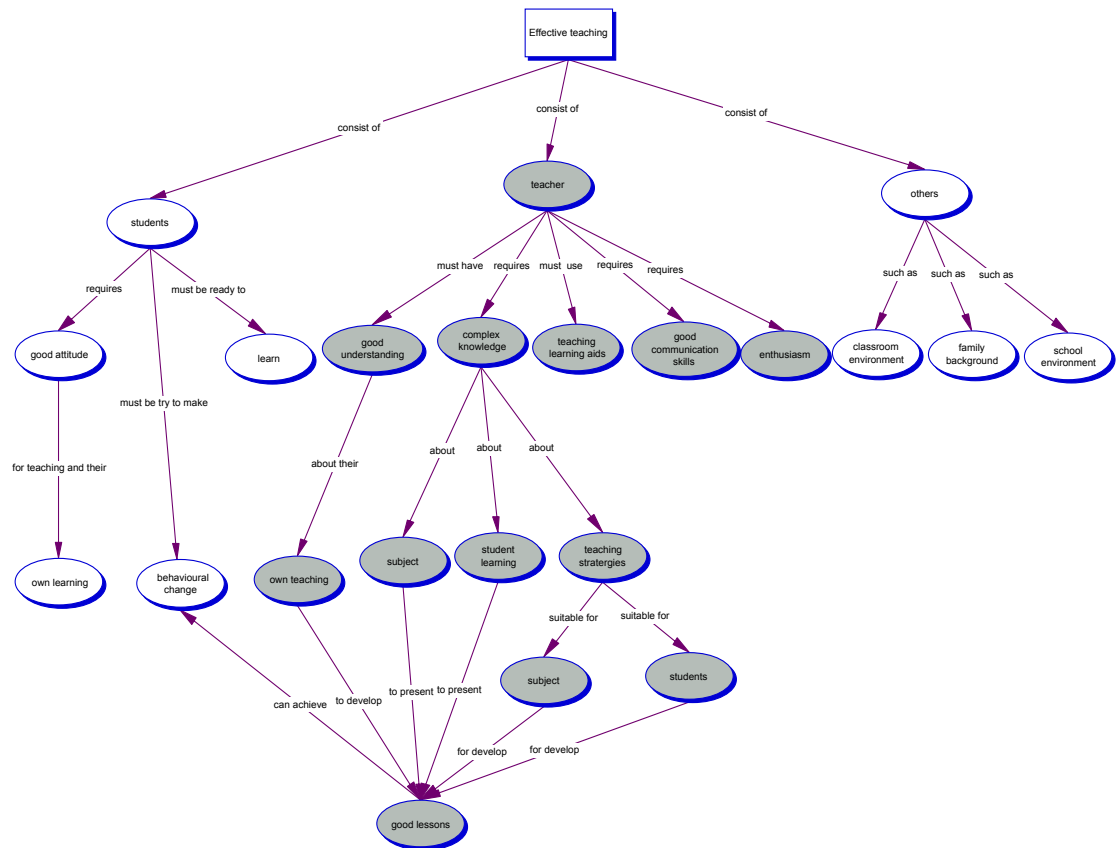


Figure 5.6 Development of the ‘teacher’ concept

Under the second organisational concept of ‘teacher’ there are five concepts placed: ‘good understanding’, ‘complex knowledge’, ‘teaching-learning aids’, ‘good communication skills, and ‘enthusiasm’. The concept of ‘good understanding’ is another major shift in Malie’s thought about a good lesson. This indicates that Malie now considered teachers as needing a good understanding of their own teaching theory and practice.

According to Malie’s third map, as in her earlier maps, the teacher also requires complex knowledge, good communication skills and teaching aids. Malie has also added two new dimensions: ‘good understanding’ and ‘enthusiasm’. These new concepts appear to relate to personal qualities required by teachers. Complex knowledge consists of knowledge about the

subject, student learning, and teaching strategies. All these things help a teacher to present effective lessons. In a good lesson the teacher must not only have a good understanding of their teaching but they must use effective teaching aids. For Malie, good communication skills involve the relationships between students and teacher, and depend to a large extent on the teacher's prior learning.

In the third map the concept, 'complex knowledge' has been linked to the sub-concepts 'subject', 'students' and 'strategies'. Malie emphasised that the teacher must have good subject knowledge. In her interview Malie said that, *if you know the subject very well, then you know what you teach and when to teach it.*

According to Malie's description, if teachers know their students well, then the teacher can evaluate them, support them, and guide them. Also, she said that teachers need good guiding skills, good teaching skills as well as good communication skills to deal with the students in the class. As she stated:

We can meet different types of students. We must deal with them all. So, we need good communication skills, good guiding skills and good teaching skills. If you have these you can easily deal with them.

Another idea discussed by Malie related to learning strategies. From Malie's description, teachers must use relevant and suitable teaching and learning strategies to develop a good lesson, and they also need to use teaching and learning aids. Other points highlight new areas to consider such as management and family background, which also affect teaching:

You know, there are number of factors that must affect your teaching, such as classroom management, school management and family background. So, we want to consider these factors.

Importantly, the new organisational concept Malie adds to her third concept map is ‘others’.

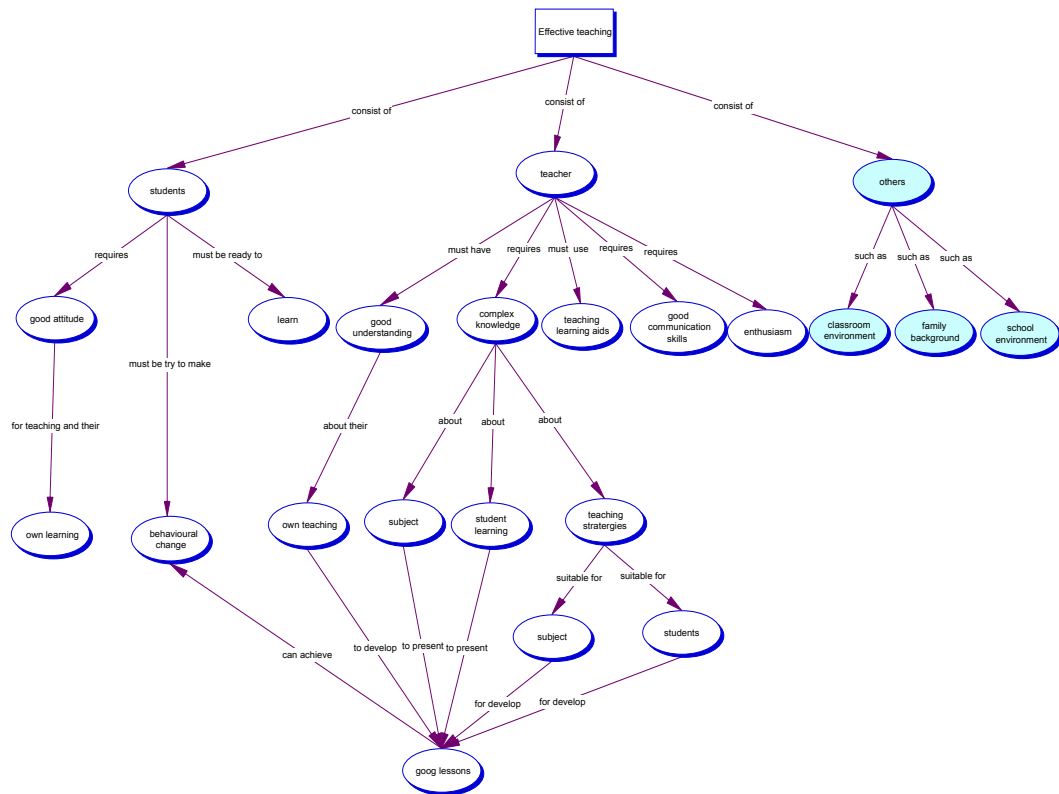


Figure 5.7 The development of the ‘other’ concept

When questioned, Malie elaborated that ‘others’ are *the classroom environment, school environment and family background*. These three factors also contribute effective teaching, according to Malie, and represent a major addition to her idea of effective teaching compared to her previous maps. This idea has been directly illustrated in her third concept map.

In her interview, Malie explained that she believed the three organisational concepts of ‘students’, ‘teacher and ‘others’ were all important for effective teaching. However, the concepts of ‘students’ and ‘teacher’ were the most important. She believed that when presenting good teaching, the teacher must be very flexible and their teaching directly relevant to the school and classroom environment.

An analysis of her three concept maps indicates that Malie increased the number and complexity of concepts, relationships, cross-links and hierarchies related to effective teaching. When explaining these changes in her concept maps, she stated that practical experience of teaching was very important in developing a teacher's role.

When I was participating in my student teaching I got more experience from my mentor teacher and other teachers, and also from the students. So, then I reflected on all these things. ... When getting practical experience I changed my previous ideas. It was important for my teaching career.

Some important and interesting changes are revealed by a comparison of Malie's concept maps. Malie included more concepts about teacher knowledge and introduced 'others' as concepts that are important for a successful lesson. The development of a good lesson becomes the overall focus of effective teaching in her second concept map. Also the students' self-learning and the teacher's teaching are linked to the students' and teachers' 'attitudes'. The cluster concept of 'students' has become less complex and the cluster concept of 'teacher' has become more complex, after Malie's practicum experience. Malie clearly shows that she believes the 'teacher' concept was much more involved than she initially thought and showed in her first map.

The 'others' organisational concept is added as important in developing a good lesson in her third map. Malie's practical experience obviously showed her that 'family background' the 'classroom environment', and the general 'school environment' are important for effective teaching. She decided that these concepts would influence how effective teaching can be.

Further, it is important to observe that the cluster concept of 'others' is not linked to her concepts of 'students' or 'teacher'. Malie explained in her third interview that the cluster concept of 'others' was not as important as 'students' and 'teacher' but was still necessary for effective teaching to occur. According

to Malie, to plan a good lesson the teacher needs to consider the concepts under 'others' such as the students' family background and environment as well as the school and classroom surroundings.

Another important observation is that, in her second map she linked 'students' with 'teacher', and indicated in her second interview that if teachers got to know their students well then they could better evaluate their progress and support and guide them. However, after reflecting on this idea after her second student teaching experience, it is evident from her third concept map that she decided, for a good lesson to occur, it was more important for the students to have behavioral change and the teachers to focus more on a good understanding of their 'own teaching', 'complex skills', 'teaching aids', including 'communication skills', and 'enthusiasm. Also, from Malie's comments in her interviews it is clear that the sources of these changes in her concept maps were her student teaching experiences and her reflections upon her zown teaching.

Summary of the Malie's case

Before her practical experience of teaching, Malie believed that students and teachers were the main components of effective teaching. Then, she believed that other concepts like environment and family background also made a difference when trying to achieve good lessons. Also, through reflection on her student teaching experience she came to realise that the 'teacher' component of the teaching process was much more complex than she first believed. The number of extra concepts added to her second, then third maps supports this conclusion. These changes could be attributed to Malie's reflection upon her own practicum experience, as well as the broader experiences gained from her practicum.

Anura's case.

Background

Anura was a twenty-five year old, bright, male student teacher enrolled in a science major. He was a very pleasant person and most of the time tried to be creative, especially in relation to the science subject. Anura was also talented in sport and music. He was at the time of the study a sport captain in the college. According to Anura, although he liked sport and would have preferred to become a physical education teacher he was not able to do this, due to limited quota so he decided to undertake study to become a science teacher.

During my schooling time I was good at cricket and football. I was also a captain in my school's football team. So, I wanted to be a physical education teacher, but I could not. So, I chose to be a science teacher.

However, it is important to note that Anura was now in his second year of college was very interested in science teaching and was endeavoring to do his best in his chosen career.

Anura came from a very popular central college, situated in a coastal area in the southern part of the island. This college is very famous for both academic performances and sports activities.

According to his interview, Anura's prior knowledge about teaching consisted of the limited experience he had gained from microteaching, classroom observation, practical teaching at the college level as well as his own schooling.

Anura's first concept map.

As with the other participants in this study, Anura developed his first concept map prior to beginning his student teaching, in the special seminar at his college. This concept map consists of three organisational concepts: 'students',

‘teacher’, and ‘resources’. It also has twelve relationships, nine sub-concepts, and two hierarchies.

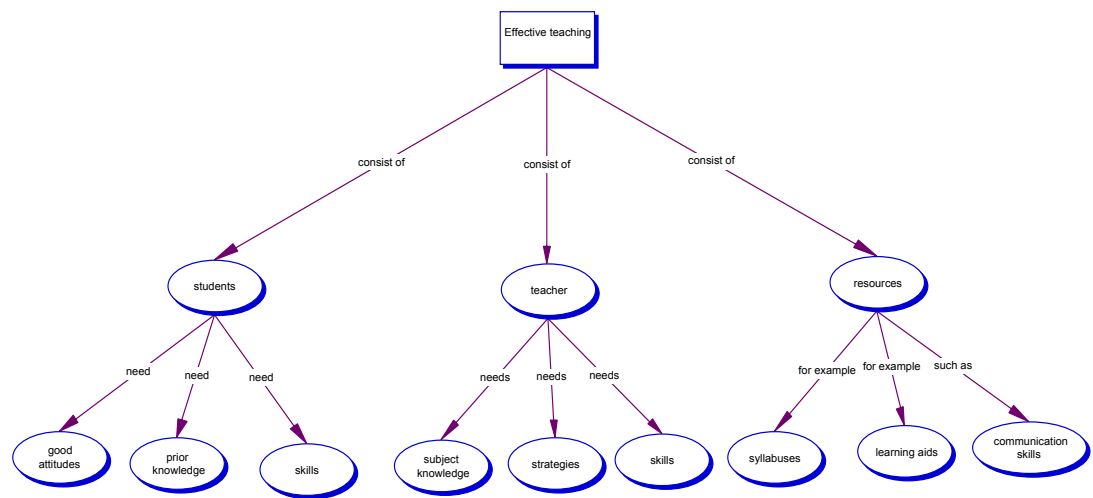


Figure 5.8 Anura's first concept map

Under the first organisational concept of ‘students’ are the concepts of ‘good attitudes’, ‘prior knowledge’, and ‘skills’. It seems that students ‘need’ those concepts to fulfil effective teaching. In his first interview, Anura mentioned that the students’ good attitudes toward teaching help the teacher to present a good lesson, and that students’ learning skills and their prior knowledge are also very useful for the continuation of the teacher’s activities. Anura demonstrated this as follows:

When you are presenting your subject content, it is important to consider your students’ level. If they have a basic understanding and some prior knowledge about the subject, then you can present your new content very easily. This is very important. That is why I placed the concept of prior knowledge, under the ‘student’ main concept.

The second organisational concept is ‘teacher’. Under this concept Anura placed three sub concepts: ‘subject knowledge’, ‘strategies’ and ‘skills’. When he was interviewed Anura confirmed these ideas stating:

Without sharp knowledge how can you present your subject well? Not only the subject knowledge is important, you should also have a good ability to present the subject. That is why I placed 'skills' and 'strategy' under teacher. As a good teacher you should try to use resources in order to achieve your aims.

Under his third organisational concept, 'resources', Anura placed three sub-concepts: 'syllabuses', 'learning aids', and 'communication skills'. According to his map, to present effective teaching the teacher needs resources, such as 'syllabuses' and 'learning aids', as well as 'communication skills'. When the researcher questioned him about why he placed the concept of 'communication skills' under the resource cluster, Anura commented that he had made a mistake, and actually it should be under the 'teacher' concept. The teacher needs to possess 'good communicating skills', 'sound subject knowledge', 'strategies', and skills' in order to achieve effective teaching, he claimed.

His first map demonstrated his understanding of teaching prior to beginning his student teaching period. All of Anura's concepts related to effective teaching and were limited to the three concepts of 'students', 'teacher' and 'resources', all of which relate directly to the classroom context.

Anura's second concept map

Anura completed his first practicum phase at a leading boys' school, which was very close to his college. That school had a good reputation for students' achievements. Anura commented:

My practicum school was a very systematic, organised one. It had a very good principal. He managed his school very well. The school had a proper plan. All staff work hard to achieve their aims. The principal wants to develop the school's academic standard... The principal tries to manage academic activities, extra curricular activities, and all other things very well. There are very good relationships between the Principal and staff. So,

most of the teachers are helping him to fulfil the goal. All staff try to develop their students' skills and knowledge.

According to his comments, those relationships and the management structure at his practicum school appear to have helped Anura to think more and reflect on his ideas about teaching.

Anura also had a very experienced mentor teacher, who gave him much advice and guidance. So, Anura completed his first practicum phase without any problems. According to his comments:

I had no problems in my practicum place, because of my mentor teacher and the principal's support. They always helped me to go ahead with my work.

Anura developed his second concept map immediately after the first phase of his practicum. This second concept map has four main concepts: 'students', 'teacher', 'resources', and 'institute'. A very interesting point is that in his second map Anura adds one more organisational concept, 'institute' with three sub-concepts. This map has fourteen sub-concepts, twenty-two relationships, one cross-link, and four levels.

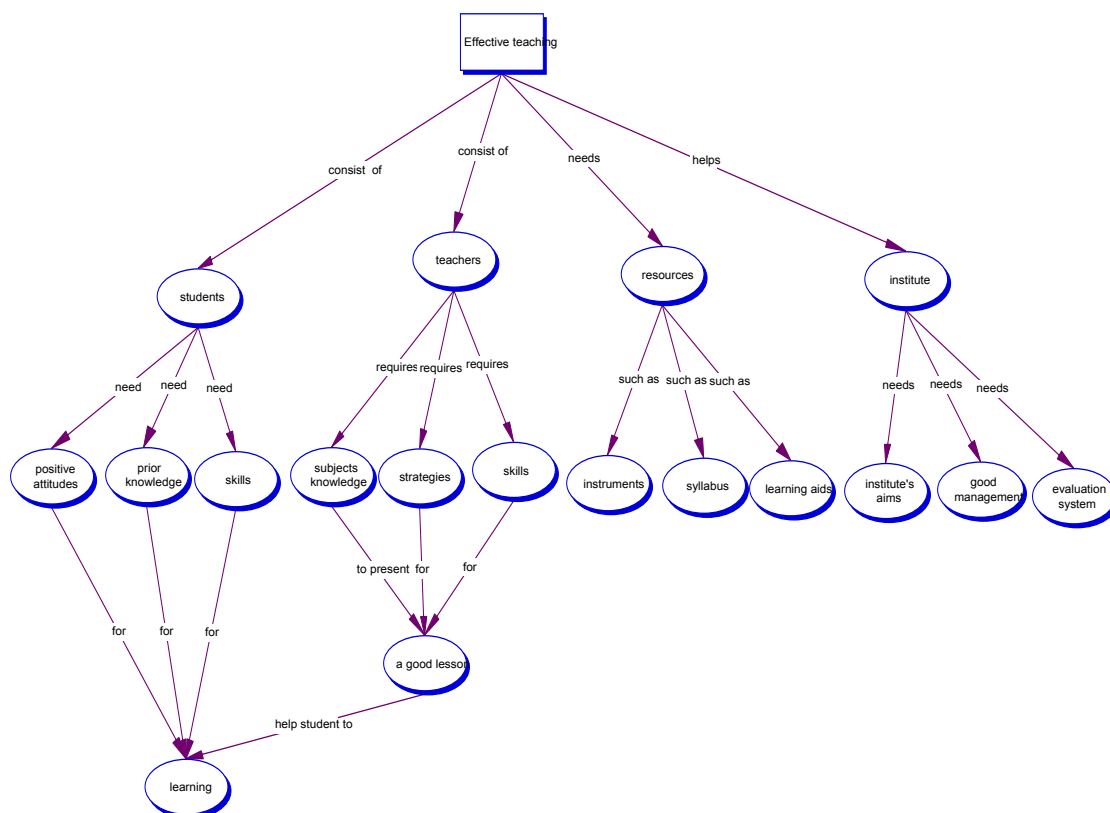


Figure 5.9 Anura's second concept map

Under the first organisational concept of students are the concepts of 'positive attitudes', 'prior knowledge', and 'skills'. These concepts lead to the outcome of 'learning'. In his second interview Anura stated that students' positive attitudes always helped both students' learning, and teaching. He further commented: *through effective teaching the teacher can develop students' learning. That is the final goal of our teaching.* Anura demonstrated a broader knowledge and understanding about teaching after his first practicum experience.

Under the second organisational concept of teacher, Anura places the same concepts of 'subjects knowledge', 'strategies', and 'skills' as in his first map. However, a very interesting point is that now all these concepts focus onto 'a good lesson', which in turn is linked to student learning. This alteration is one of the major changes in his second map. As his second map demonstrates, for Anura the teacher 'requires' subject knowledge, 'to present' a good lesson,

and also the teacher's 'strategies' and 'skills' are beneficial *for* developing a good lesson.

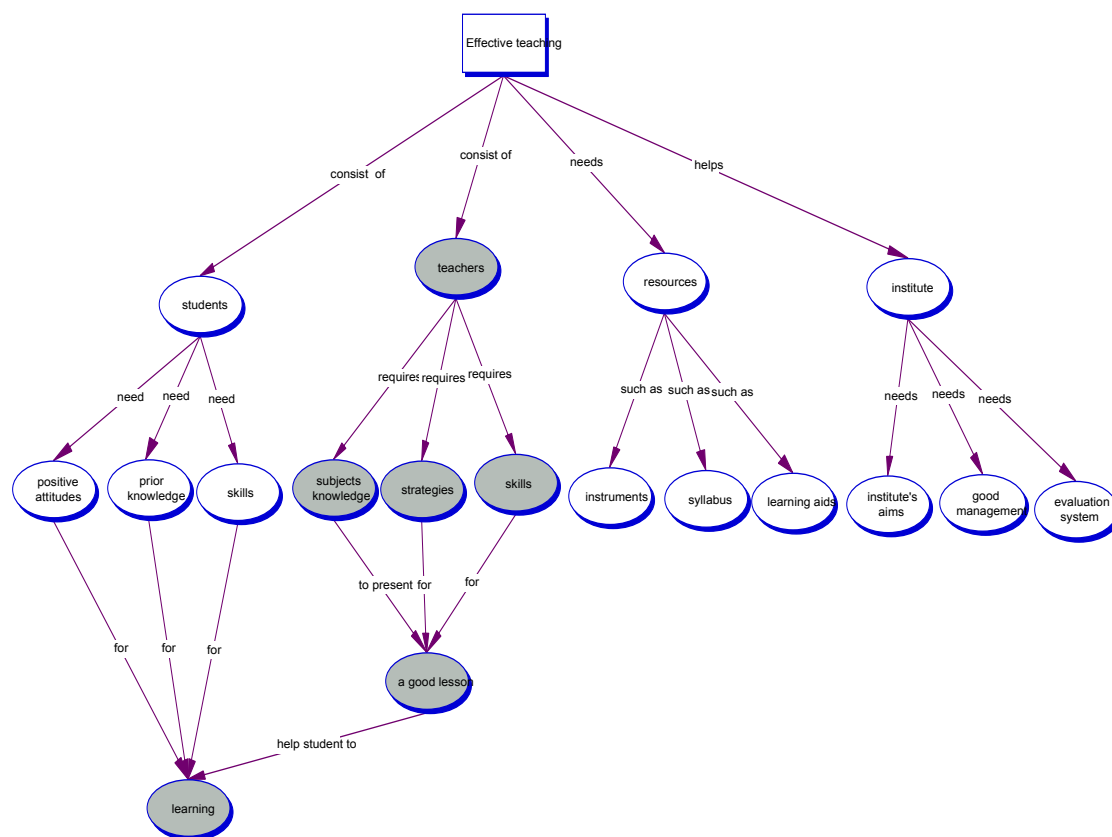


Figure 5.10 Development of the 'teacher' concept

Under his third organisational concept of 'resources', Anura placed 'instruments' (a new concept), 'syllabus' and 'learning aids'. He deleted the concept of 'communication skills' that appeared in his first map, and added the concept of 'instruments'. In his second interview Anura indicated the reason why he changed those concepts. According to his comments, 'communication skills' now goes under the concept of 'skills' in the 'teacher' cluster:

Communication skills is also one of the skills, that the teacher needs to present a good lesson. So, it can be included under the concept of 'skills'. So, we do not want to mention it separately.

This may be the reason he deletes the concept of 'communication skills'.

A significant change in his second map is the addition of the fourth main concept, 'institute'. According to his map, the 'institution's aims', 'good management', and 'evaluation system' all help teachers to present effective teaching. His 'big picture' explanation about effective teaching now includes not only the classroom but the whole school, because of his experiences from his practicum site:

My practicum school was a very nice school. It has institutional aims, good management structure, and a good evaluation system. All the teachers in the school are undergoing the evaluation system. It included self-evaluation, principal's evaluation, sectional heads' evaluation, and sometimes students' evaluation. So, teachers try to do their best. When I was teaching I also underwent these evaluations. So, I also tried to do my best. It was a very great experience to develop my knowledge.

Thus, his positive experiences of his own teaching and the supportive school environment is clearly reflected in his second map. Anura's new experiences, especially in the area of evaluation at an institution (school) level have influenced him to change and broaden his ideas about teaching.

Anura's third concept map.

Anura developed his third concept map just after completing both his student teacher phases. After his first student teacher period Anura returned to the college for a three-week period. Within this time Anura participated in two reflection sessions at the college. In those reflection sessions Anura discussed his experiences with his colleagues and supervising lecturer, and also reflected upon his experiences. His college lecturers helped him to reflect on his experiences.

According to his comments, Anura's student teacher school experiences contributed most to his understanding about teaching:

My practicum school principal, my mentor teacher as well as other teachers were very helpful for me to organise and

understand my teaching. The principal gave me a lot of advice. He guided me very well. When I started my practicum, the principal explained his school aims and how to conduct my teaching within his view. It was great advice and experience for me. Another thing, my mentor teacher guided me very well.

Anura further mentioned that his practicum school environment was very suitable for students' learning:

This school environment provided many opportunities to develop students' learning. All the teachers had positive attitudes about their school as well as their students' learning. So, they tried their best to develop their students.

This particular school environment, his experiences at the school, as well as the college reflective sessions helped Anura to build his ideas. However, as Anura commented: *My practicum school experience produced results more powerful than my reflective sessions.*

During the student teaching phase itself Anura tried hard to apply his new understanding about what constituted effective teaching, which he had gained from his student teaching site colleagues, especially his mentor teacher and the principal. Immediately after he finished his student teaching experience, Anura developed his third concept map after his two previous maps were presented to him. So Anura had his earlier concept maps in front of him as he developed his third map.

Anura's third concept map is quite different from his other maps. The main difference is that he added a whole new level of sub-concepts, which he placed under 'teacher', 'resources' and 'institutes'. There are still four organisational concepts, but now Anura's map has sixteen sub-concepts rather than fourteen, twenty-three relationships, one cross-link, and five levels rather than four levels as in the previous map.

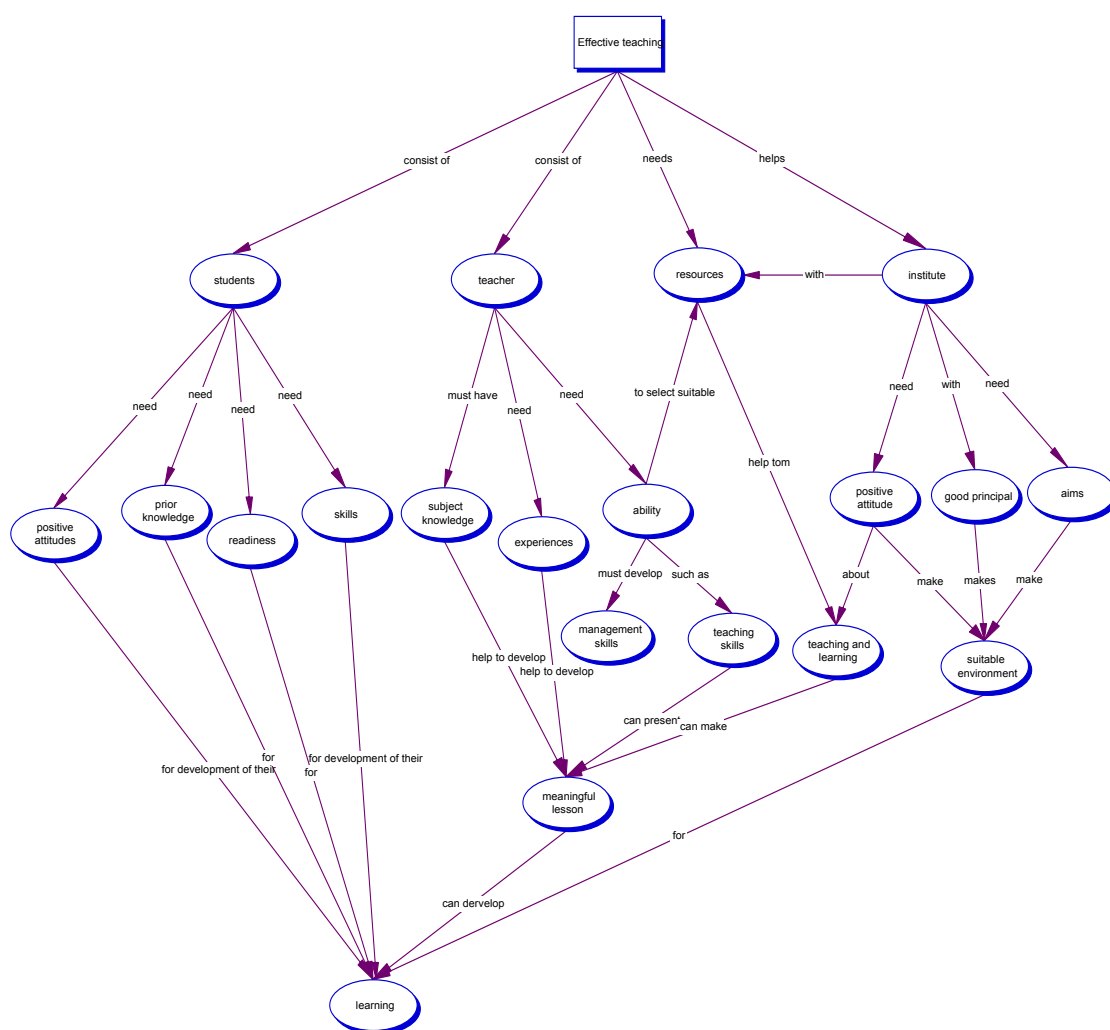


Figure 5.11 Anura's third concept map

Under the first organisational concept of 'students' are the concepts 'positive attitudes', 'prior knowledge', and 'skills', as in his second map, plus a new sub-concept, 'readiness'. His map indicates that all these concepts lead directly to the development of 'learning'. Readiness had been added because Anura now thought that, *If students are ready to learn, the teacher's role is easier.*

Under his second organisational concept, 'teacher', Anura placed three sub-concepts: 'subject knowledge', 'experience', as in his second map, and a new sub-concept, 'ability'. However, at this stage he deleted one concept, 'skills', from his second map, which had been cross-linked with 'resources'. Under the 'ability' concept are the concepts of 'management skills' and 'teaching skills'.

It seems that the 'skills' concept, which he placed at the second level in his second concept map, has now become a third level concept divided into two sub-concepts: 'management skills' and 'teaching skills'. This is another major shift in his third map. In his interview, Anura mentioned that, *good teaching ability creates a good lesson as well as good teaching*. He further said:

...for this the teacher needs and uses teaching skills. Not only the teaching skills, you should have management skills. Otherwise you cannot manage your class. You know, teaching skills and management skills are very important for effective teaching.

In his third map Anura demonstrates a broader understanding of 'skills', that is that the teacher needs both teaching skills and management skills to present a 'meaningful lesson', which will in turn develop 'student learning'.

The third and fourth organisational concepts and their clusters represent one of the major shifts in Anura's third map. The 'resources' cluster concept is reduced from three to one sub-concept, 'teaching and learning'. Also, the cluster under 'institute' is greatly changed. "Good management" and 'evaluation system' are replaced by 'positive attitude' and 'good principal'. In his third interview Anura explained that he added 'good management' and 'evaluation system' because he was inspired by the example of good leadership by the principal at his student teaching site:

The principal had a very good system, he was very organised and managed the school very well. The principal had a good plan for the school and I could see that it was a very good system to achieve his aims.

Also, 'positive attitude' leads on to both 'teaching and learning' as well as 'suitable environment' which in turn leads to 'learning'. Both the concepts of 'aims' and 'good principal' are also connected to 'suitable environment' and consequently to 'learning' as well. The reason for this change was stated as: *The principal's support meant I had no problems in my practicum place. The principal always helped the staff to go ahead with their work.*

In his third map he adds 'positive attitudes' instead of the concept of 'evaluation system'. In his third interview Anura explained why he changed that concept:

If the institute (i.e the school) has a good management system it affects the institute's efficiency and effectiveness. Evaluation system comes under the management. So, it is included in management concept. That is why I dropped the concept of evaluation system.

According to the third map, 'positive attitudes', 'aims' and 'good management' of the institute 'make' a suitable environment 'for' students' learning.

The main shift in the third map is where the concepts in all the clusters finally focus on development of learning. It seems Anura has developed a broader understanding of teaching. Anura's concept maps developed from being simplistic and predictable to being thoughtful and creative. At the beginning of the study he stated that he was ready to be a good science teacher, however the new knowledge he gained from the course, especially through the student teacher experiences and supported reflection on these experiences has helped Anura to develop his teaching concepts and ability.

I was always doing self-evaluation, as well as undergoing evaluation from everyone round me. So, the experiences at the school and when I reflected on them, was a very great experience to develop my knowledge.

Another significant development in his third map is the addition of two new levels or hierarchies, particularly the third level of the map structure which consists of only one sub-concept, 'meaningful lesson'. The positioning of this concept is important because it reveals Anura's focus on teaching at the end of the practicum. Anura's overall focus was shifted to the student's learning by

the time he drew his second map. This was confirmed in his interview when he said: *through effective teaching the teacher can develop students' learning. That is the final goal of our teaching.* However, it becomes clear in his final map that he believed to achieve the goal of student learning the teacher must present meaningful lessons.

Immediately after Anura's first student teacher phase he made one of the most interesting major changes to his thinking about what develops effective teaching: half of his concepts led on to the final concept of 'learning'. After his second student teacher all these concepts finally became related to 'learning' except for the organisational concept of 'resources', which ended at the sub-concept of 'teaching and learning'. This was a significant shift through Anura's three maps. He came to believe that all clusters led to or could develop learning. This shift of view, that the concepts in all the clusters finally focus on development of learning, indicates that Anura had developed a broader understanding about his teaching.

Summary of the Anura's case

In summary, the development of Anura's concept of effective teaching is significant in that he added a whole new level of sub-concepts in order to include new knowledge gained from his practicum experiences, his colleagues, mentor teacher, and the school principal. Anura's originally simplistic view became much more thoughtful and complex due to what he called 'self evaluation' and reflection on his experiences in this context students' learning became for him the overall goal of effective teaching.

Sarath's case

Background

Sarath is a 24-year-old male student teacher enrolled in a science major. He was a very quiet student, who came from a rural area in the eastern region of

the island, with difficult transportation and lack of infrastructure facilities. Sarath claimed that in his secondary schooling time he faced many difficulties, because the school was in a rural area, transportation was poor and the school lacked infrastructure such as laboratory facilities. It also faced teacher shortages because many teachers refused to transfer there. In spite of these setbacks, Sarath completed his secondary school examination but with lower grades, so he could not enter the university. Consequently, Sarath decided to enter a college of education, although as he said, teaching really did not interest him:

I never thought to enrol with the teaching profession. I did not think about being a teacher. Anyway, it seems it was my destiny.

Finally, I felt I had to become a teacher.

However, after enrolling in the teaching diploma course Sarath claimed he tried to be a good teacher. He also wanted to be a more creative and effective teacher because he thought that such a teacher can do more for students and society. With these interests Sarath followed his course enthusiastically, especially as he gained more understanding from course subjects such as Teaching Methodology, Teaching as a Profession, and Practice Teaching.

Sarath's first concept map

Sarath's first concept map was drawn in the special seminar at the college before starting his first practicum period. His first concept map consists of three organisational concepts, 'knowledge', 'skills' and 'attitude'. It also has eight sub-concepts, and three levels.

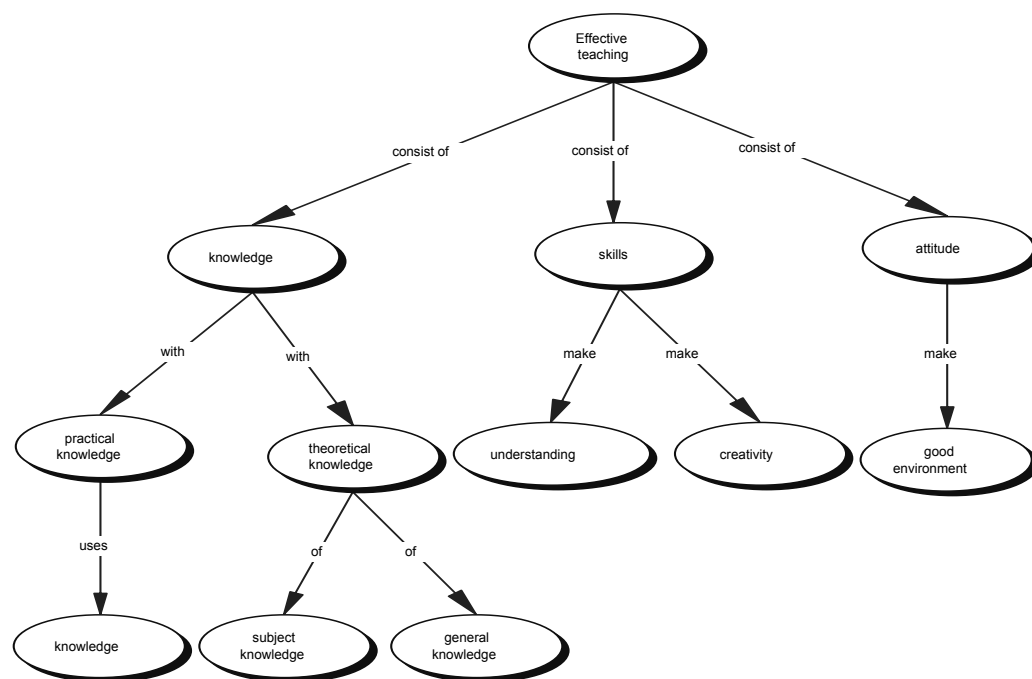


Figure 5.12 Sarath's first concept map

Under the first organisational concept, 'knowledge', he places two sub-concepts, 'practical knowledge' and 'theoretical knowledge'. With the sub-concept of 'practical knowledge' is the second-level sub-concept 'knowledge'. Under the second level sub-concept, 'theoretical knowledge' are the third level sub-concepts, 'subject knowledge' and 'general knowledge'. In his interview, Sarath said that all these areas of knowledge are needed to become a good teacher. Sarath commented:

Knowledge is the most important thing that the teacher has, and as a good teacher you need sound subject knowledge as well as good general knowledge.

According to Sarath, teachers' practical, general and subject knowledge contributes to effective teaching and help them create more activities for their lessons, which assist students gain more knowledge for themselves: *If the teacher can introduce more activities, it will help students understand the subject easily.*

However, his first map demonstrates his concept of 'knowledge' is not so clearly understood, because Sarath adds the 'knowledge' concept twice, at the first level and at the third level.

The second organisational concept in the first map is 'skills', under which are 'understanding' and 'creativity'. At his interview Sarath said a good teacher must have the creativity and skills to understand their students and lesson aims. Sarath further stated that both teacher and the students require skills; for example:

On the teacher's part, they must have teaching skills such as methodology and strategies, otherwise they cannot teach well. On the students' part, they must have learning skills to be creative and easily understand what the teachers say. Skillful and creative teachers can develop both teaching and student learning.

Sarath's third main concept in his first map is 'attitude', under which is 'good environment', demonstrating his view that 'attitudes' can make a 'good environment'. In his interview, Sarath explained that a good attitude was when students wanted to learn, which makes the teacher's role much easier. According to Sarath, the students and teacher must understand each other's roles. He said: *If the teacher has a positive attitude about teaching and student learning, it creates a pleasant environment in the class.* He also stated that a positive attitude helps the teacher to present a good lesson, and that, *If students have a good attitude they gain more from the lesson.*

Overall, Sarath said in his first interview that he believed all these concepts in his first map were equally important, but it is noteworthy that many of the explanations, relations and ideas expressed in his interview were not represented in his first concept map. They were hidden in the mapped concepts until he explained all their meanings. For example, some attitudinal ideas he mentioned in his interview are not clearly shown under the 'attitude' concept. It is apparent that Sarath failed to clearly present his ideas on the map. In

addition, most of the ideas drawn in his first map were based on a theoretical understanding of teaching, gained from his coursework.

Sarath's second concept map.

Sarath developed his second concept map immediately after his first student teaching phase, which was completed at one of the central schools very close to his college. It was a very popular school, from which Sarath expected much, but the mentor teacher had little aptitude for teaching and lacked experience. He just gave some moral support, Sarath explained:

My mentor teacher's support was mainly to organise my classes and resources. He did not give me much guidance or advice. But he was a nice man, who gave physical support rather than guidance.

Sarath's college supervisor gave him more advice and guidance during the practicum, which Sarath claimed helped him develop his teaching. In addition, Sarath spent much of the time discussing teaching with colleagues, did much journal writing, and when faced with problems and issues, discussed them with his supervisor. Sometimes he had the opportunity to speak to several experienced teachers, which he found useful in developing his knowledge. Within this environment Sarath completed the first phase of his student teaching.

Before Sarath developed his second map, his first map was presented to him. Sarath's second concept map has two new organisational concepts, 'aims' and 'good teacher'. It is important to note here, that these main concepts are rather different from the first concept map which represents a big shift in Sarath's ideas about what makes effective teaching. This map also has two organisational concepts, nine sub concepts, one cross-link, and only two levels instead of the three levels in his previous map.

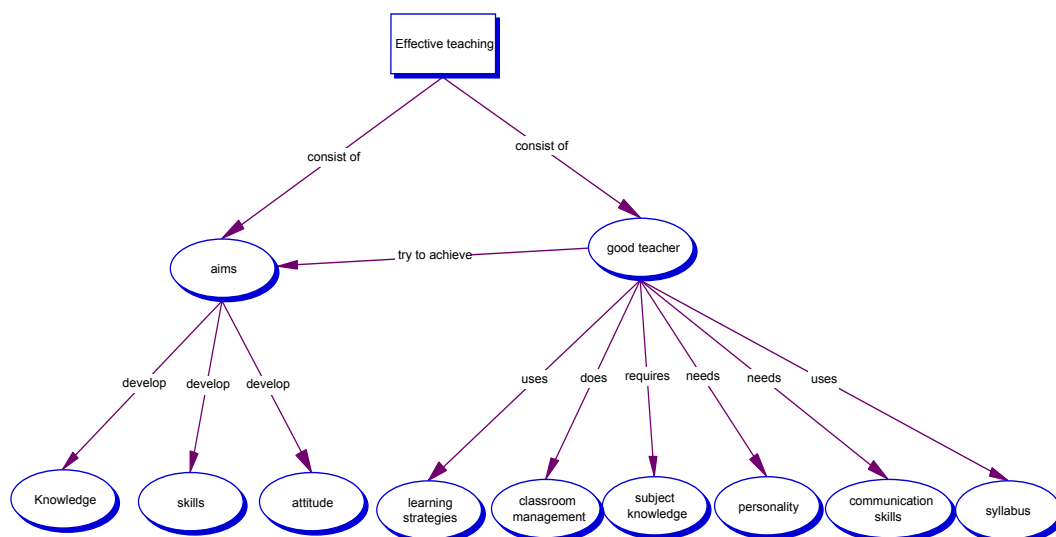


Figure 5.13 Sarath's second concept map

Under the first organisational concept, 'aims', are 'knowledge', 'skills' and 'attitude' sub-concepts, which were the three main concepts in the first map, even though they were not connected.

Another interesting point is that 'good teacher' is cross-linked one way to 'aims'. It seems that Sarath now understood the relationship between those concepts. As his map shows, a good teacher tries to achieve aims, which can develop 'knowledge' 'skills' and 'attitudes'. Below 'good teacher' is 'learning strategies', 'classroom management', 'subject knowledge', 'personality' and 'syllabus', none of which is linked or cross-linked to any other concepts, good teacher 'uses' learning strategies and the syllabus. A 'teacher' also *needs* 'personality', 'communication skills', *requires* 'subject knowledge', and must try to engage in 'classroom management'.

This second concept map is different from the first, as Sarath had changed the whole structure of the map. All the organisational concepts in map one now come under 'aims' as sub-concepts, while the 'complex nature of knowledge' has almost disappeared in the second map. Sarath's second map demonstrates his thoughts clearly in comparison to the first map, and his second interview comments show a broader understanding. At this stage of his student teaching,

he believed that teachers should try to achieve several aims and so the teacher and lesson aims were now the most important concepts:

If you want to present a good lesson you should achieve the lesson aims. Through these aims you should develop student knowledge and skills.

He also stated that teachers should be more concerned with communication skills and personality, because these are very important things to consider. Teachers require the ability to deal with all students because they are all different, therefore, 'communication skills' and 'personality' will affect every aspect of teaching and determine whether a teacher can present a good lesson. He also commented that management of the classroom environment and using teaching-learning aids such as the syllabus and other relevant instruments are vital. Thus, teachers should understand their students, their teaching, and the school environment as well as students' performances and lesson aims to be effective and present a good lesson.

Sarath summarised his second map by saying that teachers must try to achieve their lesson aims so their students can develop their knowledge, skills, and attitudes at the same time, and skills, all of which combine together and are, *very, very complex.*

From his interview comments and his second map, it appears that the changes in his views resulted from the practicum experience, interaction with colleagues and reflections on this experience. Sarath confirmed this saying, *my new understanding which comes from reflection, from my colleagues, and my supervisor, changed my first map.*

Sarath's third map

After the first phase of the student teaching experience Sarath returned to college for a three-week period. Within this period Sarath participated in two reflection sessions organised by the college where he had opportunities to discuss the student teaching experience in detail with colleagues and lecturers.

Sarath also participated in some reflective thinking workshops within these seminars. He reflected on his student teaching experiences step-by-step and claimed that, *these discussions and reflective thinking activities helped me organise my ideas*. Further, Sarath stated that the college lecturers and his supervisor also helped him organise his knowledge and understanding of teaching.

With this greater understanding Sarath participated in the second student teacher phase at the same central school with the same mentor teacher, and tried to implement this new knowledge within the classes, with his mentor teacher's support. This attempt was very successful, Sarath claimed. Immediately after the second student teacher phase Sarath developed his third concept map during the special session at the college. The previous maps were returned to him so he could consider them before developing his third map.

His third map consists of three organisational concepts, 'resources', 'teacher', and 'students', with twelve sub-concepts, twenty-one relationships, four cross links and four levels. It is interesting to note that, the three organisational concepts are now cross-linked together. It is one of the main shifts in the third map and is very different from the other maps.

A very important shift is that at this level Sarath deletes the 'aims' main concept of the second map and adds 'students' and 'resources' as the main concepts, with 'aims' under the cluster concept of 'teacher' as a sub-concept. In this final map all concepts focus on learning. Another distinctive feature is that many of the concepts are related to each other and almost all of them are linked to the concept of learning. Sarath's third map demonstrates learning as the end result of teaching, indicating a deeper understanding of the relationship between teaching and learning. Moreover, Sarath has now realised the interrelatedness of the cluster concepts.

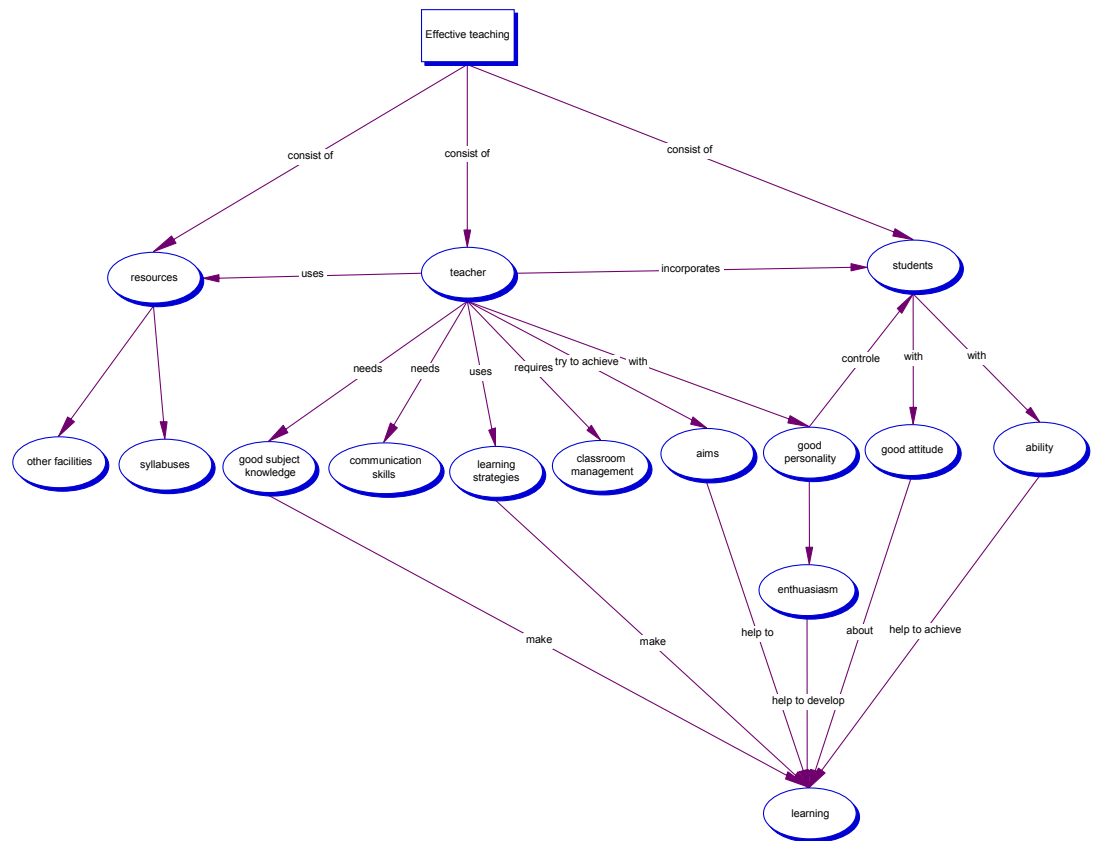


Figure 5.14 Sarath's third concept map

Within the 'resources' organisational concept Sarath places 'other facilities' and 'syllabuses', which are not linked with others concepts. However, 'resources' is linked with the 'teacher' concept. According to Sarath, teachers should use resources such as teaching aids. He said, *using resources helps make a good lesson. You know, if you are empowered with resources you can present a good lesson.*

Another interesting point is that Sarath did not include link words between the concepts of 'resources', 'other facilities' and 'syllabuses' but in his interview he said he had forgotten to draw linking words which should be, 'for example'.

The second main concept of 'teacher' is very complicated. Under teacher are 'good subject knowledge', 'communication skills', 'learning strategies', 'classroom management', 'aims', and 'good personality', which means a

teacher *needs*, communication skills, and good subject knowledge, and *requires* classroom management. A teacher also *uses* learning strategies *to achieve* aims, along with their 'good personality'. It also shows that good subject knowledge and learning strategies *make* learning. Most of the concepts under 'teacher' (except 'communication skills' and 'good subject knowledge') are linked directly to 'learning'. It also shows that a teacher's 'good personality' requires 'enthusiasm' to help a student learn, and it is important to note that 'good personality' is linked back to 'students', showing that a teacher's good personality can influence students.

Subject knowledge and good communication skills were claimed by Sarath to be essential, so too were learning strategies. Learning strategies helped teachers teach. They use a variety of strategies relevant to a student's learning ability. A good personality is necessary to manage the class, and Sarath claimed that, *otherwise you can't control your class*. Under the sub-concept of 'good personality' is 'enthusiasm'. According to Sarath, *if you love your teaching, you love your students*. This is another important change in his thinking.

In his interview Sarath explained that experience related to teaching helps in presenting the lesson, and in managing the classroom. It also helps teachers face difficulties as they arise. However, these important ideas are neglected in the third map.

The new third organisational concept of 'student' had 'good attitude' and 'ability' beneath it, which led to 'learning'. It is important to note that one of the main concepts of his first map was 'attitude' which now comes under the main concept of 'student', as a sub-concept. Students with 'learning abilities' and 'good attitudes' about their 'learning' make for effective teaching. Sarath explained that this is important because the readiness of students to learn makes a teacher's role easier.

Summary of the case

According to the maps and interviews, Sarath's final opinion of effective teaching was different from his earlier views. His initial thoughts on teaching were based on a theoretical understanding gained from coursework. Here, Sarath had used some technical words for the first map, and he did not see any relationships between the concepts. However, after his practicum experience all the concepts in his overall view focused on learning. It was significant to see that the cluster concepts of 'teacher' and 'students' are now directly related and linked with 'resources'. This student teacher was now demonstrating a deeper understanding of teaching after reflecting on his practicum experiences.

Nirmala's case

Background

Nirmala was a 24-year-old female student teacher of mathematics. She had a pleasant personality, was one of the more prominent students and was, according to her lecturer, an academic leader.

Initially, Nirmala's teaching experience was limited to microteaching, model teaching, and prior classroom observation. Despite this, Nirmala had a basic understanding from her experience in teaching principles of Secondary School Education, assisted by her diploma subjects such as Elements of Education, Educational Practice and Teaching as a Profession.

Her interest in teaching probably sprang from her parents, who were both teachers:

My parents were teachers, so too my sister and I can remember living at the school quarters when I was a child. I saw my parents work very hard at the school, which I found very interesting.

Nirmala comes from a very populated urban area situated up-country, in the middle of the island. She had studied at a very popular private school which emphasised discipline and academic performance. Her personal experience, diploma course and schooling experience would have provided most of the theoretical knowledge Nirmal brought to the study.

Nirmal's first concepts map

Her first concept map was constructed before the practicum period based on her prior theoretical knowledge. It includes four organisational concepts, which suggest that she thought effective teaching *requires* knowledge, attitude, skills and training. This map also consists of only two levels which have had five sub-concepts, nine relationships, and no cross-links.

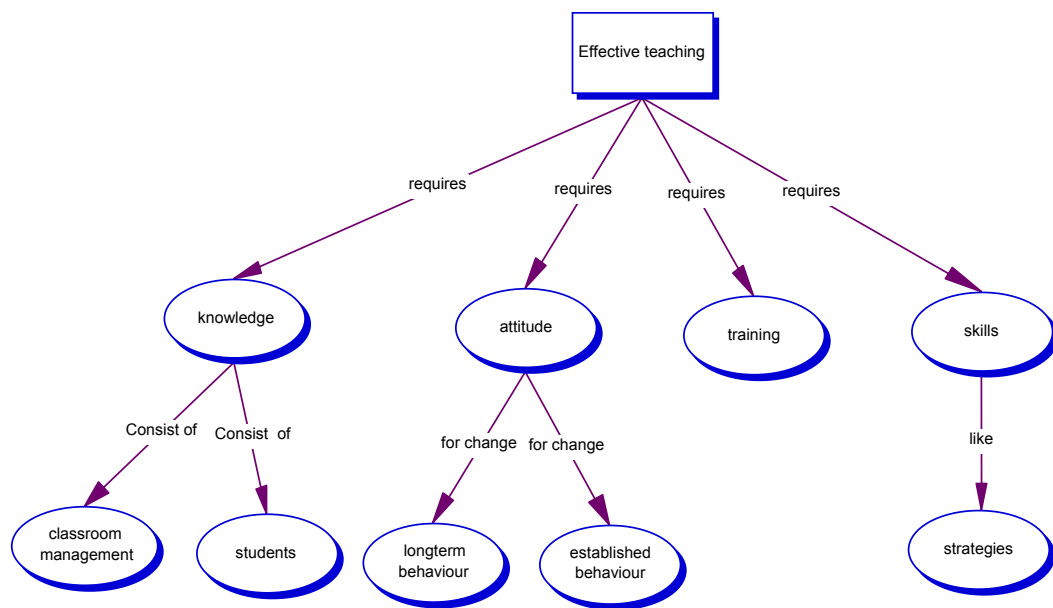


Figure 5.15 Nirmala's first concept map

In this map Nirmala has represented the organisational concept 'knowledge', as consisting of knowledge about 'classroom management' and 'students'. In her first interview, Nirmala explained that, *properly trained teachers know how to manage their class and students*. She also said that, *if teachers know their students well, they can manage them and guide them, and will also help develop students' learning*.

Nirmala also identifies three other organisational concepts: 'attitude', 'training' and 'skills'. Under the second main concept of 'attitude' she places 'longterm behaviour' and 'established behaviour', but understanding what she meant by these concepts was very difficult. In her interview, Nirmala said that 'longterm behaviour' and 'established behaviour' were necessary to create a good lesson. However, these concepts of behaviour were not clear and Nirmala did not explain the difference between them, which suggests that her understanding was limited, that at this stage she believed a teacher only needs a positive attitude to change these behaviour patterns. It appears that at this early stage of her career Nirmala presents a behaviourist view of teaching. This may be

explained by her college lectures which explore at this stage different learning theories.

The third organisational concept is 'training', an important organisational concept on her first map because it has no sub-concepts or cross-links to other concepts. In her interview Nirmala said:

I believe that properly trained teachers have knowledge, skills and good attitudes towards their teaching, but without proper training they will not have these attributes.

However, this idea expressed in her interview is not developed in her first map.

The final organisational concept identified by Nirmala is 'skills', with the sub-concept of 'strategies'. As her map demonstrates, effective teaching requires 'skills' such as 'strategies', but this map does not represent the thoughts expressed during the interview, where she said. *Successful teaching requires teaching and learning strategies, without which is it difficult to develop an interesting lesson.*

It seems that most of Nirmala's ideas were not clearly represented on the map and were largely based on her theoretical understanding of teaching gained from the diploma course.

Nirmala's second concept map

Nirmala completed her first student teaching phase with some lack of facilities for practice and little motivation from the student teaching site. According to her own account and informal comments from the mentor teacher to the researcher, her student teacher site was not well managed and had poor facilities. However, she engaged in many discussions with practicum site teachers, colleagues and the college lecturers. These discussions and her own reflections helped Nirmala to change her thoughts about teaching, which may

explain the inclusion of the ‘student management’ sub-concept in her second map.

Nirmala constructed the second concept map just after the first practicum phase. It contains three levels, eleven concepts and sub-concepts, eleven relationships, and no cross-links.

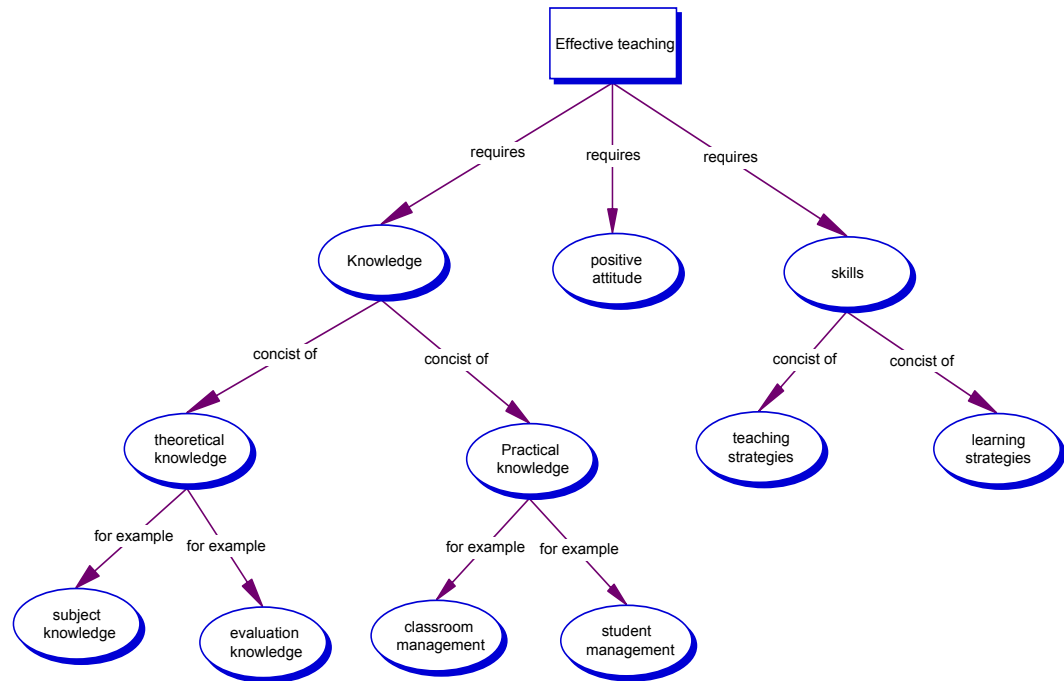


Figure 5.16 Nirmala's second concept map

The second concept map contains only three organisational concepts, ‘knowledge’, ‘positive attitude’ and ‘skills’. ‘Training’ is no longer seen as a requirement for effective teaching in her second map as the concept of ‘training’, which she had included in her first map, has been removed. In her interview, Nirmala stated that ‘knowledge’, ‘positive attitude’, and ‘skills’ could be gained from training, and was no longer needed as a particular concept.

The first organisational concept of ‘knowledge’ consists of ‘theoretical knowledge’, and ‘practical knowledge’, with ‘theoretical knowledge’, comprising ‘subject knowledge’ and ‘evaluation knowledge’. She supports

this by saying: *Unless teachers know their subject and how to evaluate students and their work, they are poor teachers.*

‘Classroom management’ and ‘student management’ are sub-concepts of the ‘practical knowledge’ concept.

The second organisational concept is ‘positive attitude’, which contains no sub-concepts. It is interesting that the concept of ‘positive attitudes’ is no longer linked to any other concept. In her second interview Nirmala said she replaced the ‘attitudes’ concept (in her second map) with ‘positive attitudes’, because a teacher requires a positive attitude to their teaching as well as to students’ learning: *Attitudes should be positive, otherwise teachers cannot develop their teaching.*

The final organisational concept of ‘skills’ consists of ‘teaching strategies’ and ‘learning strategies’. ‘Learning strategies’ is a new sub-concept added after the student teaching, which suggests that now she has represented her thoughts more clearly through the map.

In her second interview, Nirmala stated that teachers should know their subject, gain a positive attitude and relevant teaching skills from their training. She explained that practical knowledge also comes from training and involves knowledge relevant to the teaching role: *...for example, knowledge about classroom management, student management and the school environment.*

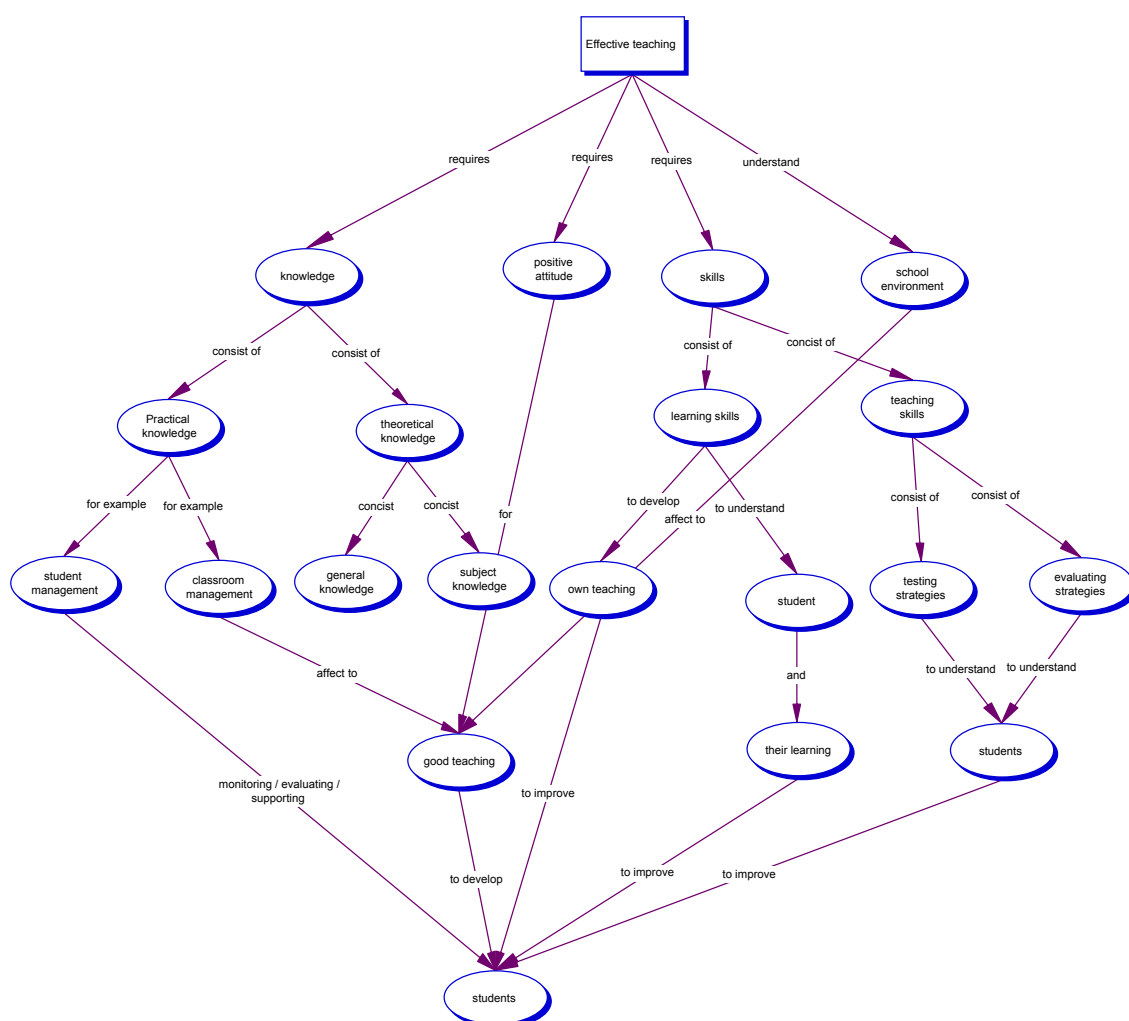
An important point is that Nirmala mentioned ‘training’ but this concept is not on her second map. She also commented on how a good teacher can manage the classroom: *Good teachers can manage their class if they know their subject and how to evaluate as well.* When Nirmala was questioned about the placement of the main concept of ‘skills’, she stated that the teacher must use various strategies, which should also be suitable to a particular school as, *effective teachers require teaching strategy and learning strategy skills.*

Nirmala said that the changes between her first and second concept maps came from various sources such as the student teacher site experience (both negative and positive) and discussions with the mentor teacher, supervising lecturer, and friends at the college. These discussions helped her to reorganise the concept map according to this new knowledge.

Nirmala's third concept map

Nirmala constructed her third map after the second phase of the student teaching. After the first student teaching phase she spent more than three weeks at the college, during which she participated in three reflective seminars and discussed many matters related to the student teaching site with colleagues and lecturers. She also took part in some workshops using reflective thinking and problem solving methods, and reflected on her teaching experience. At the time, the college lecturers had suggested that students practise their new knowledge during the second practicum phase, and it appears that Nirmala took their advice.

Nirmala constructed her third map immediately after the second phase of the practicum and it is much more complex. Her third map contains five levels or hierarchies, twenty-one relationships, twenty concepts and six cross-links. As well as the three main cluster concepts from her second map she added 'school environment'.



5.17 Nirmala's third concept map

In her third concept map Nirmala also developed four organisational concepts: 'knowledge', 'positive attitude', 'skills' and 'school environment'. 'School environment' being the new concept she added to the third map. This is one of the major shifts in the third map. According to Nirmala this is very important because the school and classroom environment affect teaching. *If the school and classroom environment are not suitable for learning, you can't present a good lesson.*

The first organisational concepts under 'knowledge' remain the same apart from some minor changes, however, it appeared that Nirmala now understood how 'classroom management', for example, affects 'good learning' and how 'student management' monitors and supports 'student learning'. She also

developed more sub-concepts under ‘skills’ and ‘positive attitude’. For example, under ‘skills’ there are two concepts, ‘learning skills’ and ‘teaching skills’, where ‘learning skills’ consist of *understand* ‘students’ and ‘their learning’, and *improve* ‘students’ *to develop* ‘own teaching’ *to improve* ‘student learning’. The ‘teaching skills’ organisational concept consists of ‘learning strategies’ and ‘evaluation strategies’, which are needed to understand and improve student learning.

Under the ‘skills’ organisational concept, are the concepts of ‘learning skills’ and ‘teaching skills’. All the concepts under ‘learning skills’ and ‘teaching skills’ focus on the ‘students’ concept, as do all the concepts under other main concepts. After completing her student teaching Nirmala, seems to have understood that all concepts merge to developing students and their learning.

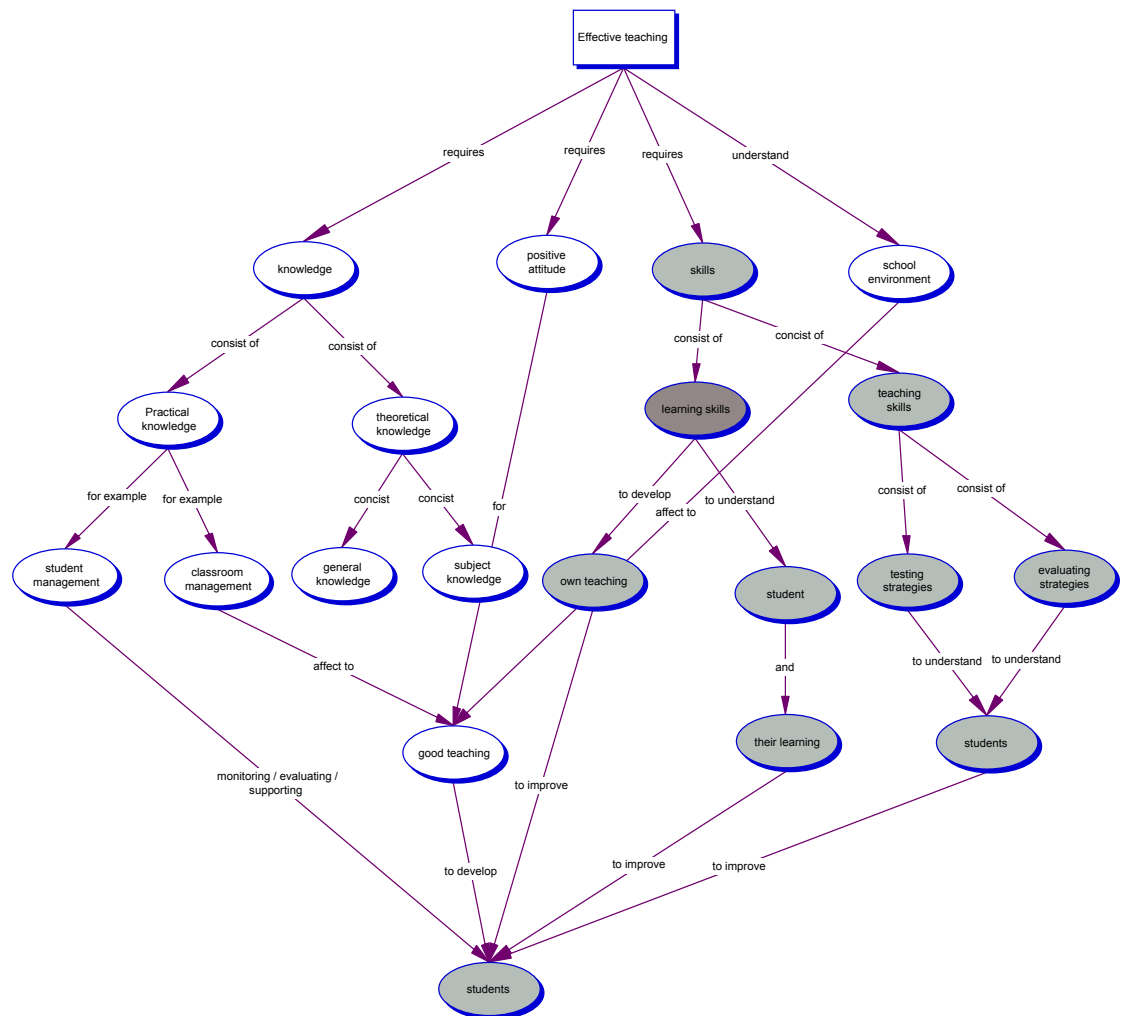


Figure 5.18 Development of the concept of ‘skills’

Importantly, in the third map all concepts are related to effective teaching, which is finally focused on the development and support of 'students'. The map suggests that Nirmala now saw students as the focus of effective teaching, as she explained in the third interview:

You should be deeply concerned about your students, because they are the only living things in your class that affect your teaching. Whatever you teach directly affects them.

These ideas reveal a deeper understanding of effective teaching.

Also interesting is that there are no cross-links in Nirmala's first and second map, but her third concept map is much more complex, with some cross-links.

In her third interview, Nirmala stated that after her practical teaching experience she realised the importance of training and experience. Nirmala commented: *If you have good training and experience, you have sound knowledge and good attitude and skills for your teaching.* According to Nirmala, creativity is a very important factor, because: *A creative teacher can make a good learning environment within the classroom which helps students' learning.*

The most important factor she mentioned in third interview was 'flexibility'. Teachers should be flexible in the classroom and school environment and especially towards students: *As a good teacher, your lesson must be relevant and suitable for your students and your classroom. So, you need be very flexible.*

Nirmala said that these ideas are not included in her map. Her greater knowledge and changed opinions about teaching had come from more understanding, gained from her student teaching site experience. Gaining real

experience helped her to reorganise her own ideas: *When you are getting more and more experience you eventually realise what teaching is about.*

An interesting point is how both positive and negative experiences helped alter Nirmala's perceptions of teaching. Nirmala said her practicum site was badly managed, with most teachers and some parents having negative attitudes. After her practicum period, with those negative experiences, she participated in the college reflective sessions. In these sessions she deeply discussed her experience with colleagues and college lecturers. These discussions with colleagues and lecturers may have helped in her reflections on effective teaching. She may have finally realised what effective teaching means, which would account for the major changes in the final concept map, that and a deeper understanding of the complexity of teaching.

Summary of Nirmala's case

There was a substantial shift from the simplicity of Nirmala's first concept map through to the final concept map for effective teaching. One of the most striking shifts was the extensive development between Nirmala's second and third concept maps. After gaining more experience from the practicum site and participation in the reflective workshops at the college, Niramla saw more and more concepts as related to effective teaching. Many more concepts were added under the organisational concept of 'skills', which all led to the concept of 'students'. For Nirmala teaching focused directly on understanding and improving the learning of the students, which indicated a much more complex understanding of what constitutes effective teaching.

Malanie's case.

Background

At the time of the study, Malanie was a 25 year-old female science student teacher. During her schooling Malanie had studied hard to pass her advanced level examination and she had had hoped to enter the medical college. However, she missed that chance because of the low pass marks in her examination results. She then decided to enter the college of education to study the teaching diploma course. Initially she knew little about the teaching profession and had 'no idea' about teaching. However, a few months after enrolling in the course she had decided she would endeavour to be a good teacher. She was enthusiastic about enrolling in the professional subjects, however she commented; *It was a very hard exercise for me. Somehow I did it.*

When she started her practicum, Malanie still had little understanding about teaching. According to Malanie, she had gained some theoretical knowledge about teaching from the professional subjects of her diploma course, which included subjects such as Education Psychology, Educational Practice, Teaching as a Profession, and Teaching Methodology. With little understanding about practical teaching and with some theoretical understanding and knowledge about the teaching profession, she faced her first practicum phase with some reluctance.

Malanie's first concept map

Malanie constructed her first concept map in a special session at her college before starting her practicum. This concept map consists of two organisational concepts, 'students' and 'teacher', with eight sub-concepts, ten relationships, one cross-link, and two levels or hierarchies.

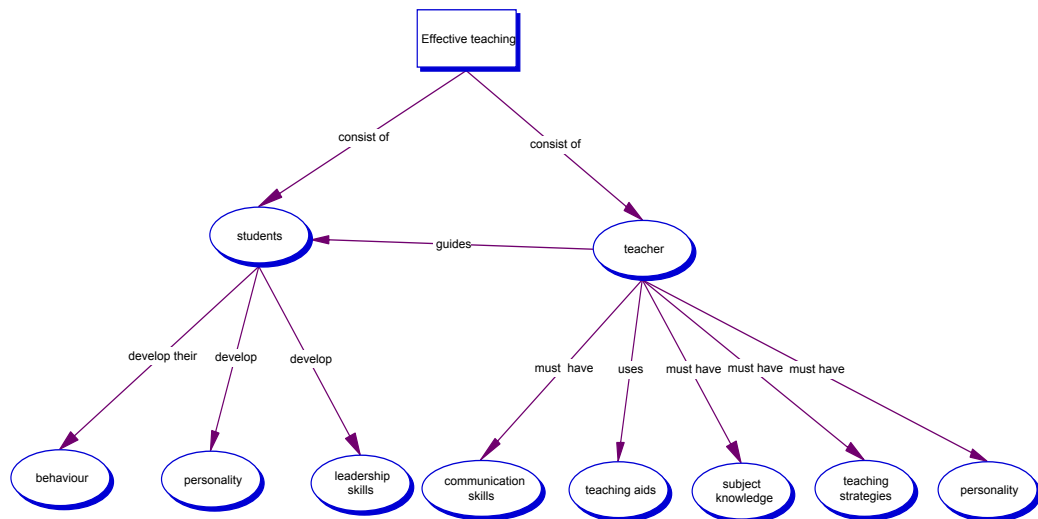


Figure 5.19 Melanie's first concept map

The map shows that Malanie's opinion, at first, was that effective teaching *consists* of two major concepts: 'students' and 'teacher'.

Under the 'student' organisational concept are the concepts of 'behaviour', 'personality' and 'leadership skills'. Malanie said in her interview that when effective teaching occurs, the students try to develop their behaviour, personality, and leadership skills through their learning. Malanie believed that if the students could develop their behavior, then it would positively affect the presentation of a good lesson. At this point in her experience she indicated that effective teaching depends to some degree on the degree to which students develop their behaviour, personality and leadership skills under the guidance of the teacher.

In Malanie's first concept map, the second organisational concept of 'teacher' includes the following sub-concepts: 'communication skills', 'teaching aids', 'subject knowledge', 'teaching strategies', and 'personality'. Malanie said that she considered the teacher to be *the most important factor* in effective teaching. She linked the concept of 'teacher' to 'students', because as she stated in her first interview, she believed teachers should guide their students and the student's role also affected teaching.

In her first interview, Malanie stated that the teacher needs good subject matter knowledge to develop student learning. However for her, the teacher's personality was one of the most important factors in good teaching.

Personality is one of the main influences that you can see in good teaching. If the teacher has a good personality, the teacher can manage and direct students very easily.

Furthermore, communication skills was another important factor for good teaching, *because good teachers always try to communicate nicely with their students*. Malanie also stated: *If you can develop inter-relationships with your students that means you are using good communication skills well.*

She also explained that effective teachers always *try to use teaching aids for their teaching* in order to develop good lessons and student learning.

Malanie also placed teaching 'strategies' under the concept of 'teacher'. In her interview she explained that good teaching strategies were important for effective teaching and good learning. They must be suitable and relevant to the lesson and the students: *If you can present relevant and suitable strategies, then students can develop their knowledge and overall learning.*

On examination of Malanie's first map and her interview description, it is evident that much of her understanding about teaching at this stage was based on the knowledge that she gained from her diploma course subjects.

Malanie's second concept map

Similar to the other participants in the study Malanie developed her second concept map immediately after her first student teacher phase. According to her comments, her student teacher site was a very popular urban school, which had maintained a good disciplinary situation for students and a very good learning environment, and had a very popular principal:

You know, my practicum site was a very nice school. It had a very good principal. He managed everything very well. That school had a very good relationship between the principal and staff... teachers and students... principal and students, and also school staff and parents. Those nice relationships had made a good learning environment. When I was there, all the parties helped me to conduct good lessons.

According to Malanie, she accomplished her student teaching period very easily, and it was a *really remarkable* experience for her. So, Malanie had a positive attitude to and pleasant recollections of her student teaching site, largely because of the support and guidance given to her there.

Before she developed her second map, her previous map was presented to her. Malanie made a number of interesting changes in the second map. The second map has three main cluster concepts' to 'teacher' and 'students' she added a third concept, 'good school environment'. It also contains thirteen concepts (including the three main concepts) related to the topic, thirteen relationships, five cross-links and three levels or hierarchies.

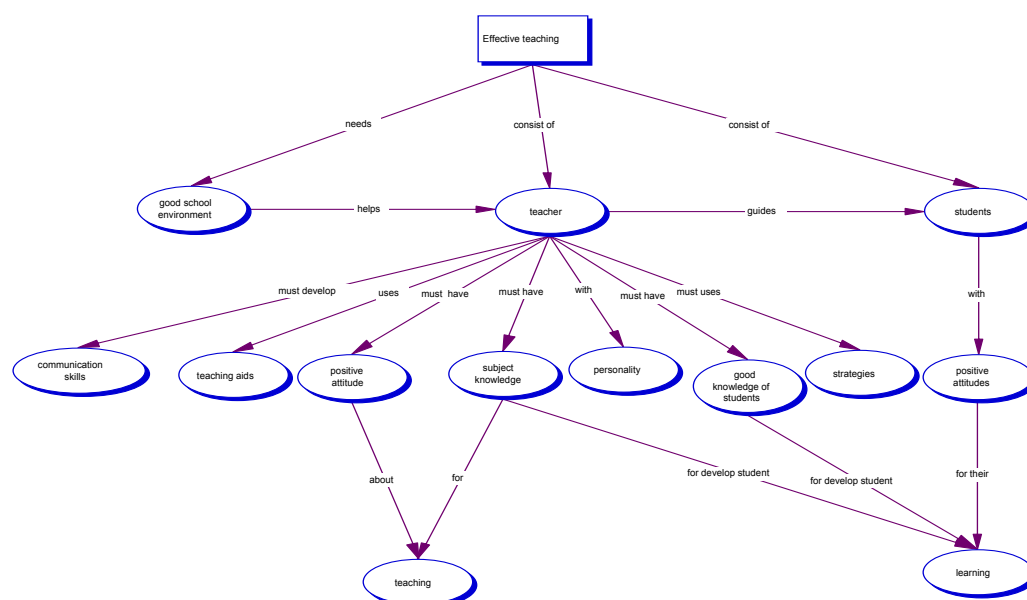


Figure 5.20 Malanie's second concept map

The concept of ‘good school environment’ is cross-linked with the ‘teacher’ concept as indicates that Malanie believes that the school environment *helps* the teachers to guide student learning and their own teaching. It is evident that the student teaching experience, had influenced her beliefs about effective teaching. For example, in her interview Malanie stated: *My school environment helped me go ahead with my lesson without any problems.*

Under the second organisational concept of ‘teacher’ she added two more concepts to her original map, ‘positive attitude’ and ‘good knowledge of students’, and deleted one concept, ‘communication skills’ (see Figure 5.20). The concepts under ‘teacher’ now read ‘communication skills’, ‘teaching aids’, ‘positive attitudes’, ‘subject knowledge’, ‘good knowledge of students’, ‘personality’, and ‘strategies’. The sub-concept of ‘teaching’ is now placed under ‘positive attitudes’ on the third level. Malanie’s second concept map clearly shows in her understand of teaching, thorough significant progress, broader definitions and a more complex concept of ‘teacher’.

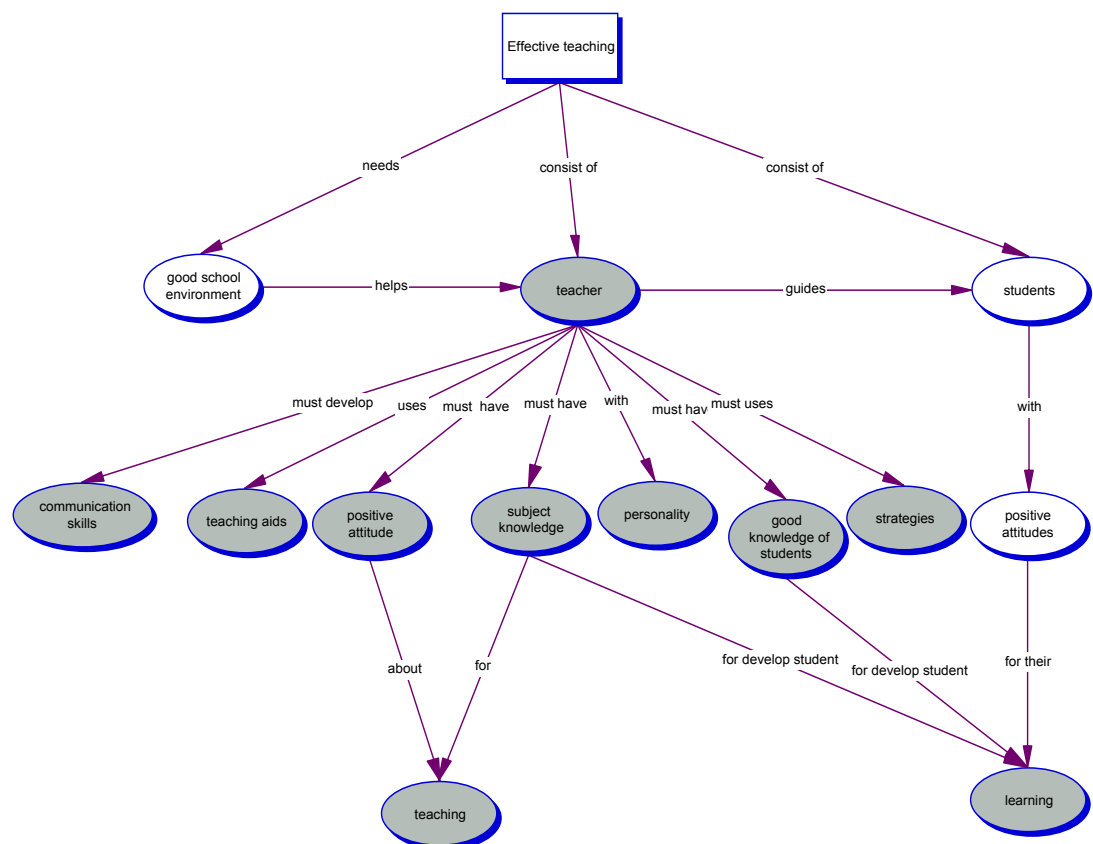


Figure 5.21 Development of the ‘teacher’ concept

It seems that at this stage Malanie believed that the teacher must have positive attitudes about teaching and good subject knowledge for good teaching. Importantly, Malanie has also linked both 'subject knowledge' and 'good knowledge of students' to 'learning'.

These ideas reflect a deeper understanding about teaching. Her practice teaching experience contributed to these ideas, as Malanie commented:

When I worked with my mentor teachers and other experienced teachers in my practicum site I realised students' learning was the most important thing to achieve effective teaching.

In this interview, Malanie finally expressed the idea that effective teaching is concerned with both the teacher's as well as students' learning. She stated that, *a good teacher does love teaching as well as the students, and they have good attitudes about their teaching.* According to Malanie that is why she added 'positive attitudes' under the teacher concept, and she stated that this realisation was one of the most important development points in her teaching career.

Under the third organisational concept of 'students' is the concept of 'positive attitudes'. Malanie linked this to learning as she believed that students with positive attitudes can develop their own learning.

Also, she commented in her interview that the school environment also affects good teaching, because a good school can help make a good classroom environment. She mentioned, *if the classroom environment is good, the students will have good opportunity to develop their learning.* She further stated that, *with rich facilities and good attitudes they can learn easily.*

Malanie concluded that the student teaching site environment influenced her development of these ideas as it was a very good learning environment. In Malanie's second interview she further discussed this factor:

If you have a good school environment you can play your roles very easily, because a good school environment can make a good classroom environment. When your classroom environment is good it can make a good opportunity for students to develop their learning.

This notion can be identified in Malanie's second map. She understood the classroom environment and the school environment as both influencing 'students' learning. This was another important shift in her understanding about teaching. The good learning environment of her student teaching site helped Malanie develop these ideas, that within a good learning environment students learning can be more easily developed, including their attitudes. Moreover, when both the teachers and the school environment can together maintain positive attitudes among teachers, the students can develop their learning as well as their positive attitudes.

As well as the school environment, Melanie understood the 'teacher' is seen as another major factor in effective teaching because of their major role in the classroom. According to Malanie, for effective teaching the teacher requires sound subject knowledge, positive attitudes, good knowledge of their students, teaching strategies, and learning strategies. Moreover, she mentioned that the teacher's good attitudes about their teaching and about their students helped students to develop their learning. The teacher's teaching ability and personality also affected the effectiveness of teaching, Malanie claimed:

You know, good teachers do love their teaching as well as students and they have good attitudes about their teaching... They must try to maintain a good personality, because teachers' personalities affect their teaching. As a teacher you should have an ability to control your students. Otherwise, you can't guide them, you can't instruct them.

Malanie further noted that students also had some responsibility for effective teaching, especially in relation to their active participation and positive responses.

Malanie's third concept map

After her very positive experience in her first student training phase, Malanie returned to the college for a three-week period. During this time Malanie participated in two reflective sessions at the college. These sessions provided opportunities to reflect upon and build on her student teaching experiences. Malanie was asked to present her experiences during the session and then to discuss and critically analyse them. The college lecturers and her colleagues helped and supported Malanie to analyse her experiences.

Malanie also participated in one reflection workshop at the college. In that workshop Malanie had opportunity to participate in a critical thinking session. According to her comments this was very interesting and important to Malanie because she critically analysed all the events related to her practicum experiences. According to Malanie, as a result of the reflections, she gained much greater understanding of her teaching.

Malanie tried to apply her new knowledge in her teaching within her second student teaching phase of the practicum. As well, Malanie's student teaching site principal, other experienced teachers and her mentor teacher instructed her as she developed further understanding. Malanie illustrated this by saying, *When I asked something from them, they explained it well.* Malanie completed her second phase of practicum and constructed her third map immediately afterwards, with her first two maps in front of her.

After the second phase of her practicum, Malanie had developed still more ideas about teaching and her third concept map reflects these. Her third map has more concepts and relationships as well as cross-links: four main organisational concepts, 'good environment', 'good teacher', 'students' and 'outsiders'; eighteen sub-concepts; twenty-three relationships; and fourteen cross-links; and five levels or hierarchies.

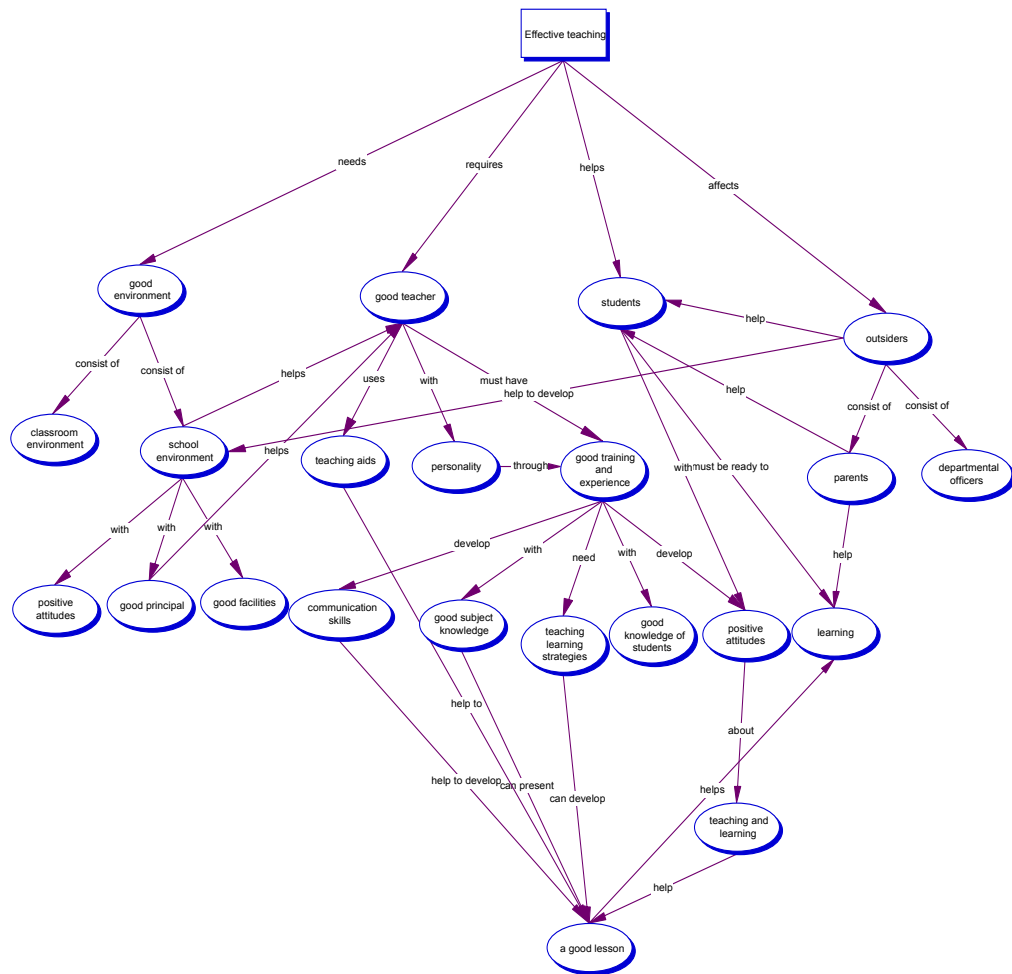


Figure 5.22 Malanie's third concept map

Malanie's new concept map includes another major organisational concept, 'outsiders'. Also, it is interesting that Malanie added the descriptor of 'good' before 'teacher'.

One of the most interesting shifts is that she has developed more sub-concepts under the all the main concepts. Finally, most of the concepts under the main concepts link to the concept of 'good lesson'. That is, effective teaching culminates in a good lesson. This is supported by the Malanie's comments:

If you can develop a good lesson, you have done good teaching. It was effective. If you have been successful, you can develop your student learning.

So, Melanie finally reflected that the students' learning would be the outcome of a good lesson.

Another important shift in her third map is that Malanie has changed some concepts that she had drawn on her previous maps. She appears to have considered more concepts as a result of participating in the practicum. According to her interview statements, the practicum site environment, especially the principal, had influenced her changes:

He does manage everything in the school very well. This school has good relationships between the principal and teachers, teachers and students, principal and students, and also the school and the community.

She further mentioned that these effective relationships had made a good learning environment within the school. It appeared that all the parties in the school helped Malanie to further develop her knowledge about teaching. She saw it as a very important and very interesting experience.

Under the first organisational concept of good environment are the concepts of 'classroom environment' and 'school environment'. There are three concepts, 'positive attitudes', 'good principal', and 'good facilities', under the concept of 'school environment' which is cross-linked to 'good teacher', as it *helps* the teacher to present effective teaching.

In her third interview Malanie noted that a good principal as well as good facilities make a good school environment for teaching:

This school environment consists of two features: good principal, good facilities. Those are very important, because if the principal has enough facilities, he can develop a good learning environment within his school. And after that he can develop various sections, facilities, his staff, his students, and this entire thing can affect your teaching.

She further emphasised that the school environment directly affected teaching. The principal, other teachers, students, as well as their own attitudes also help the teacher to present a good lesson. Moreover, she mentioned that a good classroom environment was very important to teaching because within a good environment both students and the teacher can engage with (or in) their work very easily.

The map also shows that ‘good teacher’ has three sub-concepts: ‘good training and experience’, ‘teaching aids’, and ‘personality’. Two of these concepts, ‘good training and experience’ and ‘personality’, are also linked together. Below ‘good training and experience’ are ‘communication skills’, ‘good subject knowledge’, ‘teaching learning strategies’, ‘good knowledge of students’ and ‘positive attitudes’. Most of these concepts eventually focus on ‘good lesson’. Then the good lesson concept links back to ‘learning’.

In her interview, Malanie spoke of the importance of training and experiences for effective teaching:

If the teachers have good experience and good training they will know their profession's roles well, and they could also gain more understanding about their teaching.

This training can supply sound subject knowledge and practical knowledge and the skill of teaching-learning strategies, according to Malanie.

Moreover, Malanie emphasised that it was important to have good communication skills. Teachers need to communicate with different types of students, so when the teachers deal with those students they should use different communication styles and strategies. She stated that if the teachers want to have good relationships with their students, they must develop their communication skills.

Under the third organisational concept of students are ‘positive attitudes’ and ‘learning’. The ‘students’ concept is also linked to the concept of ‘outsiders’. In her interview, Malanie said that students’ positive attitudes help them to

develop their learning, and that the family background and parents also affected students' learning. Malanie claimed that this is why she had drawn the relationship between the concepts of 'students' and 'parents'.

According to her map, the final organisational concept is 'outsiders'. There are two concepts, 'parents' and 'departmental officers', placed under the concept of outsiders. 'Outsiders' can *help* teachers to do their teaching very easily. Malanie believed that parents' support was important to develop both student learning and teachers' work.

Malanie had clearly gained more experience from the practicum school as well the reflective sessions at the college. She had observed some experienced teacher's classroom activities and behaviours and her mentor teacher's classroom procedures. At that time, she had especially been concerned with how those teachers performed their roles, how they dealt with their students, and their subjects. In that process Malanie had extended her concepts of effective teaching, and reorganised her ideas in order to develop her knowledge about teaching. Malanie's new understanding and ideas about teaching are represented her third map. The main feature of Malanie's third map is its complex nature, which demonstrates her view of the complex nature of the profession of teaching. Through her reflective experiences and practicum experiences, Malanie had realised that a good teaching-learning environment include both the school and the classroom. She now has a broader view, which includes, teacher, students, parents the development of students. She also emphasised the need for good aims, good supportive principals, positive attitudes and good learning facilities.

Summary of Malanie's case

Clearly, it can be said that Malanie's student teaching site experiences helped her to develop her knowledge about teaching. As well, her reflective experiences added positively to this knowledge. Malanie's practicum school environment had considerable effect on her and caused her to reflect on her

knowledge about teaching. Malanie's mentor teacher, other experienced teachers, and the principal were ideal models for Malanie. Through their activities, attitudes and role modeling, Malanie gained more knowledge and understanding about effective teaching. These positive experiences helped Malanie to reorganise her knowledge about teaching. From the features of her third map, it can be said that Malanie developed her understanding about teaching and her 'big picture' of the concepts involved in effective teaching has now become extended and more complex. Her new opinion was that effective teaching helps the student to understand the lesson well. From practical experience she realised that effective teaching can be facilitated by the school environment and the other people in the school environment such as the principal, students, teachers, and parents. Teachers' positive attitudes, resources and teachers' experiences were all important now in Malanie's 'big picture'.

Summary of chapter five

This chapter has presented the science major student teachers' case studies. Across the participants it may be concluded that through the student teaching period many of the changes have been seen in the student teachers' views and opinions.

- For, Malie, the major outcome was the realisation that the teacher component of the teaching process was more complex than she initially thought. Malie came to this realisation after her student teaching experience.
- Anura's greatest change was that effective teaching not only depends upon teachers, students, and resources, but also on the learning institution providing a suitable learning environment.
- Sarath's opinion altered from his initial views to a belief that a focus on learning will result in effective teaching.

- Nirmala's concept of effective teaching became more complex and she achieved a much better understanding about the concepts involved after gaining more practical experience.
- Finally, Malanie's understanding of effective teaching also changed throughout her practical teaching experience and reflection on it, resulting in a belief that effective teaching results from the student understanding the lesson well with help from a supportive school environment.

Summary across all the case studies

In summary, across all students, both science and mathematics, it appears that their practical experiences in teaching and their discussions of and reflection on it, have changed their views and opinions on what effective teaching is, that through these practical experiences and their reflections, the students appear to have developed a deeper understanding of effective teaching is. For example:

- Shamalie's view of teaching became very complex. She elaborated that other factors such as parents are an important part of the learning and teaching process and that learning and a good lesson are essential goals for effective teaching.
- In the case of Kumar, development of his knowledge and understanding related to effective teaching increased. He identified more and more concepts related to teaching and his view on effective teaching became more focused on both improving and understanding teaching and learning. He developed a wider understanding of what constitutes effective teaching as opposed to his initial concepts which related to the teacher's side only.
- In Elvina's case, the lack of facilities and resources at her practicum school and the students' negative attitude towards learning helped her develop the concepts on what makes an effective teacher. She realised the difficulties a

teacher can face as well as the student. The most obvious change in her opinion of what constituted effective teaching was that resources are the major factor along with teachers and students.

- Sanjaya developed an understanding that effective teaching involved students and other factors and not just the teacher. His concepts relating to effective teaching now involved both the teacher and student, linked together, as opposed to his initial understanding of effective teaching, from the teacher's view only.
- Piyal's view on teaching was greatly affected by the experienced teachers at his practicum site, where they helped him develop his ideas extensively. Other factors that influenced Piyal's view on effective teaching were the students, students' activities and the school environment.
- Malie realised that the teacher component of the teaching process was more complex than she initially thought after her practical experience.
- Anura's simplistic view became much more thoughtful due to what he called 'self evaluation' and reflection on his experiences so that overall the students' learning became the overall goal of effective teaching.
- Sarath's final opinion on effective teaching altered from his initial views and he now believed that effective teaching needs to focus on learning.
- Nirmala's concept of effective teaching also became more complex and she achieved a much better understanding the concepts of effective teaching. She identified more concepts related to effective teaching, particularly under the concept of 'skills', which linked directly to the concept of the 'student'. Thus, Nimala's view of effective teaching became directly focused on improving and understanding the students.

- Malanie's opinion on and understanding of effective teaching also changed and became more complex and detailed. At the time of her drawing her third map believed that effective teaching would help the student understand the lesson well and relied on help from the school environment.

Across the case studies, it appears that some similarities and differences can be seen. Many of the concepts these participants used for describing good teaching were very similar, especially in the initial maps. This may be influenced by the course content and the college context, remembering that all the participants gained their professional subject knowledge from the same college teachers and the same context. Another contributing factor could be the reflection sessions undertaken between the student teaching periods.

It appears the student teaching period also had some influence on their understandings. After gaining their student teaching experience, most of the participants showed a broader understanding about their teaching. Importantly, most of the participants completed their student teaching experience within a positive and motivating environment within their practicing schools. However, some student teachers, especially Elvina, faced difficult situations. For Elvina, her student teaching experience was very negative. However, it appears her negative experiences helped Elvina to develop her understanding about flexibility in teaching.

Both chapters four and five have presented the data collected from the ten student teachers that participated in this study. The data has been presented as multiple case studies due to the appropriateness of this methodology for clarifying the student teachers' understanding about teaching. All data collected from each student teacher's interview, concept maps, were combined for each case study. Conclusions from this data will be analysed and discussed in the next chapter in order to make recommendations for further research and course development in the field of teacher education.

Chapter Six

Discussion, Recommendations and Implications

Introduction

This study endeavoured to identify how Sri Lankan pre-service teachers organised and changed their understanding about teaching during their student teaching period. The study was undertaken to gain further understanding of student teachers' knowledge about teaching, to inform the development of teacher preparation courses in Sri Lanka. This research was designed to allow the researcher to examine student teachers' knowledge organisation at different stages in their student teaching period. 'Concept mapping' was the major tool used to investigate how student teachers' knowledge organisation or construction and reorganisation altered throughout their student teaching period.

In the previous two chapters, the data from the student teachers' concept maps and interviews have been presented as individual case studies. This chapter presents conclusion from these case studies related to the research questions. Implications will be drawn and suggestions made to improve teacher preparation courses in Sri Lanka, particularly focusing on the individual student teachers' development and their understanding relating to effective teaching. Finally a number of recommendations as a result of this study will be made for further research. The chapter is presented in two parts. In part one the of the findings will be presented. Part two of the chapter presents relevant recommendations and implications as well as directions for further research.

Part One-Discussion of findings

This section will discuss the data across all of the case studies to answer the following research questions.

- How do pre- service teachers' knowledge and concepts of teaching, alter over the student teaching period?
- What factors contribute to these alterations ?

Research question 1: How do pre-service teachers' knowledge and concepts of teaching, alter over the student teaching period?

To answer this question the discussion is organised under the following sub-headings:

- Introduction
- The first maps
- The second maps
- The third maps

Introduction

The study research design enabled an understanding of how the student teachers organised and reorganised their understanding of effective teaching over time. The use of concept maps and interviews revealed how and when the changes in the student teachers' understanding took place as well as how their prior knowledge interacted with their first teaching experience during their practicum. The study design also evaluated the patterns of change by the participants over time.

The participants (student teachers) constructed three concept maps during the study to illustrate their views of what constitutes '*effective teaching*'. Effective or good teaching was indicated by 'Singhalese' term '*Sarthaka*

Egenveema'. This overview describes the development of the three concept maps over time.

This discussion outlines the results of the study, in particular the patterns of change to the participants' knowledge about effective teaching. The themes that have emerged from the study will be explored, such as the smaller number of concepts related to pedagogical knowledge in the first maps, as well as the apparent differences the participants had in identifying broad related concepts in the classroom, their inability to see the 'big picture' of the school context and the very negative focus on the role of the teacher. Other themes that will be analysed include the student's ability to transform and create knowledge and the increasing complexity in expressing these notions in the participants' concept maps.

The first maps

The following observations were consistent across the majority of the first maps which the student teachers developed before their practicum period. The first observation is that the constructions of the first maps were generally more simplistic and often the same basic terms were used across different students maps. This suggests the possibility that the student teachers were incorporating information from their college experience due to their limited experience of classroom teaching at this stage. This was confirmed by an analysis of their completed maps and follow-up interviews. Often similar or the same terms were used by different students suggesting that they were using the theoretical knowledge or terms they had discussed in their college text books or classes. For example, Elvina included the concepts of '*strategies*', '*teaching materials*', '*learning instruments*', while Sarath included the concepts of '*knowledge*', '*skills*' and '*attitudes*', which may suggest that these concepts were learnt at college, or gained from educational sources such as text books. All of the participants in this study gained and developed their professional

understanding in the same context and they also participated in the reflection sessions together.

The second observation is that most of the concepts in the first maps appeared to relate to the classroom or the course context. For example, Malie and Elvina had only two main concepts '*teacher*' and '*student*' and both Piyal and Anura introduced the term '*resources*'. Sarath's first concept map only introduced '*knowledge*' '*skills*' and '*attitudes*' as being important for effective teaching. So, it appears that at the beginning of the study the student teachers were highlighting areas identified as subject knowledge and formal theoretical knowledge, which may have been gained from their college subjects. These terms were consistent with the content being taught at the college classes. Also Sahamalie's map showed that he believed a combination of *skills*, and *strategies* were important for the development of a good lesson which would result in changes in student behaviours (learning). Most of the concepts identified in their maps represented the knowledge which they gained from their course. Moreover, over time the student teachers continued to repeat terms which could be seen as terms learnt in their college study. These persisted across maps. For example, Kumar, Elvina and Shamalie all used terms like '*in the classroom*' and '*out of the classroom*' which indicate they were simply resulting theoretical information discussed in their courseworks or learning materials.

Another initial observation is that '*the student*' tended not to be featured prominently in the first maps. The first maps tended to focus more on '*the teacher*' and '*teaching*' but not on '*students*' and '*student learning*'. The only four student teachers who included '*students*' as a concept in their first maps were Malie, Elvina, Malanie and Anura. The majority of student teachers did bring the student into more prominence in their second map. However, for Sanjaya, the concept of '*student*' did not appear until the very end. It could be suggested that at this stage of drawing their first maps the

participants regarded the teacher's role as more important than that of the students' when describing effective teaching. For example, Kumar's first map had no concepts for '*students*', but seven concepts related to '*teaching*'. Malanie's first map which did include 'students' as a concept, had only three concepts under '*students*' and five concepts under '*teacher*'.

The simplicity of the first maps is also revealed in the one-way relationships and the small number of cross-links evident. In the first maps the number of cross-links ranged from 0 to 2. For example, Malie and Shamalie had only one cross-link while Sanjaya had two. Also, there were fewer levels. The only student teacher to go beyond three levels was Shamalie who had five levels in her first map.

Although there were few concepts developed under the concept of '*students*', there were many more developed under the concept of '*teacher*' such as '*strategies*', '*skills*', and '*personality*'. For example, Elvina had three concepts under '*students*' and five under '*teacher*', Shamalie had two under '*students*' and six under '*teacher*', while Malanie had three under '*students*' and five concepts under the concept of '*teacher*'. It is interesting to observe that there were no links between the terms '*students*', '*teacher*' and '*learning*'. It means that at this stage the student teachers were not thinking in terms of the relationships between teachers, students and learning.

In summary, the first maps were relatively simple, and straight forward, primarily including concepts that related to college coursework knowledge, concepts limited to the classroom, that were focused on teachers more than students, and did not generally go far beyond the first level after the organisational concepts. Perhaps the reason for the simplicity of the first maps is due to student teachers' limited knowledge as a result of their coursework and their brief practical teaching experience in the first year of their course. Also, these maps were probably limited to '*classroom*' concepts due to the students' lack of knowledge about the relationship

between theory and practice at this stage in their courses and lack of student teaching experience. All these assumptions might also help to explain why the first maps did not generally go beyond the first level after the organisational concepts. These judgements were further supported by analysis of the changes that developed over the subsequent maps.

The second maps

The first map was drawn by the students before their student teaching phases, while the second was completed after they had finished their first student teaching phase. The student teachers participated in field-based practicum and therefore they gained different knowledge from different types of school environments. So their second concept maps were based more on their individual student teaching experiences.

As a concept, '*student learning*' rarely appeared in the first maps, however in the second maps '*student learning*' began to appear as an important concept. Many participants also focused on the concept of '*lesson*'. Malanie and Sarath highlighted the lesson in their maps while Kumar, Anura, and Piyal also highlighted '*learning*' as being important for effective teaching. So, at the end of the practicum period, almost all of the student teachers had the '*students' learning*' as a prominent concept linked to effective teaching. A '*good lesson*' also featured in their maps, especially, that of Kumar who recognised '*good teaching*' and '*good learning*' would "produce" '*a good lesson*'. Therefore, it seems that the students' concept of *effective teaching* had changed from being teacher-centered to featuring the '*student*' more prominently. It appears that after the student teachers gained more practical experience, from actual teaching situations, they identified that '*student learning*' was more important for effective teaching.

It is also important to observe that after gaining real teaching experience the student teachers extended their views to include some concepts from

outside the classroom. This is clearly seen in Anura's second map with the introduction of the '*institution*' concept, while Malanie's map introduced the concept of '*school environment*', and Kumar's map included '*training*', '*experience*' and '*teaching ability*'.

Another general observation in the student teachers' second maps is that at this stage there were no overall changes in the importance given to the roles of '*students*' and '*teacher*'. The number of times the concepts of '*resources*' and '*knowledge*' were used was reduced; ('*resources*' from three times to two times and '*knowledge*' from three times to one). '*Training*' was also reduced (from three appearances to one). Also, some student teachers focused more on the concepts of '*lessons*' and '*learning*', but still limited most of the concepts in their maps to the classroom process. For example, Malie, Sarath and Kumar focused effective teaching concepts onto '*lesson*' within the classroom. In contrast, Malanie's second map focused on '*learning*', as the others did, but she expanded some relationships to include the '*school*'. She indicated that effective teaching '*needs*' a good school environment. In addition to Malanie, Anura also expressed the importance of the concepts of the '*institution*', '*aims*', '*good management*' and '*evaluation system*' in his second map.

In comparison to their first maps, the student teachers developed more relationships among concepts, expressed as cross-links in their second maps. They also developed more levels of concepts; for example, Kumar's second map had seven cross-links and four levels. Piyal's second map had four cross-links and four levels or hierarchies. In contrast, Shamalie had four levels but no cross-links and Nirmala also had no cross-links in her second map. This may indicate that these student teachers at this stage had not recognised inter relationships within the concepts.

Overall then, by the time of the second maps the student teachers had elaborated more concepts relating to both the '*students*' and the '*teacher*', although in general still more concepts under *teacher* than *students*'. For

example, Shamalie's second map included seven concepts under the cluster concept of '*teacher*,' however, under the '*student*' cluster concept she had included only four concepts. Elvina on the other hand, had included six concepts under the concept of '*teacher*', but she had added only two concepts under the cluster concept of '*students*'. In their second maps most of the student teachers also included more concepts related to the students' role in effective teaching. For example, in Shamalie's map under the concept of '*student*' she included '*family background*', '*positive attitudes*', '*learning needs*' and '*learning skills*' as all being important for effective teaching, while Anura believed that students need to have a '*positive attitude*', '*prior knowledge*' and '*skills*' for their learning through a relationship link of '*need*'.

It is probable that this development of relationships among concepts was influenced by the participant's new practical classroom experience. It is likely that the students were becoming aware that the teacher is not the only person who is involved in developing effective teaching. The maps support this judgment as they show an increase in the number and type of concepts related to the factors and people outside the classroom itself that contribute to achieving effective teaching. However, the relatively limited observable differences between the first and second maps in the choice of concepts seems to reveal that the student teachers were still relying more on theory of teaching rather than practice, to understand '*teaching*'.

The third maps

In the student teachers' third maps a sharp contrast to their other maps could be seen. The third exercise indicated how the students were developing a broader view of what is involved in effective teaching. For example, Shamalie's third map appeared more complex, addressing areas such as the '*administrative structure*', '*parents*', and '*outside resources*' and identifying '*others*' who may influence effective teaching. Malanie on the other hand included the concepts of a '*good school environment*' and '*outsiders*'.

This change or broadening of emphasis is supported by Knoener-Ekstrand (2002) who conducted a study of how student teachers in secondary Social Studies constructed and reconstructed their practical knowledge about teaching. Knoener-Ekstrand placed special emphasis on addressing the gap between school-based experiences within teacher preparation programs and outside resources, and influences such as family background, prior schooling experiences, personal values, and the political and educational philosophies of the student teachers. Knoener-Ekstrand (2002) argues that:

The traditional model for student teaching assumes that university based coursework provides the necessary content knowledge and theoretical pedagogical knowledge for teaching and the student teaching field placement provides a context in which pre-service teachers can practice applying that knowledge under the guidance of co-operating teachers and university supervisors. (p.1)

Kroener-Ekstrand (2002) supports the notion of why the third maps in the current study may have broadened providing the big picture of what is involved in effective teaching.

The change of emphasis in the third concept maps developed by the participants supports the work of Hawkins's (1974, cited in Knoener-Ekstrand, 2002) *I-Thou-It triangular model*, which claims that there is a tripartite relationship in pre-service education where the student teacher's knowledge broadens and develops throughout their career from pre-service, during teaching and in their later years. In his study, Kroener-Ekstrand (2002) shows how Hawkins's model can be used to demonstrate student teachers' knowledge constructions during the practicum. The extended Hawkins model triangle thus becomes a pyramid with four sides. These four sides represent coursework, practicum, and the teacher educator's role and leadership phases. The first two phases are conducted concurrently so that the 'I' point of the triangle now represents the methods instructor,

university supervisor, co-operating teachers and cohort peers. 'It' represents professional knowledge about teaching methods as well as practical knowledge about teaching methods.

The predominant observation across the third maps is that over time the view of effective teaching had broadened significantly. The simple constructions of the previous concept maps had become much more complex. This move towards greater complexity suggests that the student teachers had come to see that teaching itself is complex. Part of the complexity comes from building on the former maps. Most of the student teachers (for example, Shamalie, Piyal, Malanie, and Sajaya) added concepts to their maps rather than removing them. However, some developed new maps that were structurally different and some student teachers developed new maps each time. For example, Piyal's and Kumar's first maps are completely different from their third maps.

The student teachers' concept maps were progressively transformed from simple to complex, with more concepts, more levels and more cross- links. For examples, Malie's first two maps only had '*students*' and '*teacher*' as the main concepts for effective teaching, then her final map added '*others*'. Sarath's maps had '*knowledge*', '*skills*', and '*attitudes*', (first) '*aims*', and '*good teacher*', (second) and '*resources*', '*teacher*' and '*students*', (third) which indicated a notable change. Shamalie also had '*human resources*' and '*physical resources*' as her main concepts in her first and second maps but her third map was far more complex with '*good administration structure*', '*students*', '*others*', '*teacher*', '*resources*' and '*parents*'. Nirmala's first map had '*knowledge*', '*attitudes*', '*training*' and '*skills*', then her second map only had '*knowledge*', '*positive attitudes*', and '*skills*'. However, her third map had the additional main concept of '*school environment*'. Finally, Kumar's maps had '*training*', '*experiences*', and '*teaching ability*', (first) '*training*', '*experiences*', '*teaching ability*', and '*students*' (second). In his third map however, Kumar had organised all these concepts under two main concepts: '*good teaching*' and '*good*

learning'. The student teachers' third maps suggest that their understanding about teaching had extended beyond a narrow focus on the teacher to include, as important, knowledge of learners, knowledge of subject content, and knowledge of educational context and ends. This broader understanding reflects Shulman's (1992) 'teaching cycle', including Shulman's categories of the 'teacher knowledge base'. For most of the students their third maps suggests that they are building the resources, that is, knowledge of the teaching environment to be all to critically analyse their own teaching in order to identify what they need to change.

Almost all the student teachers reconstructed their understanding and knowledge of the main concepts of effective teaching with increasing complexity. It is very interesting to note that while only half of the student teachers were given their previous maps to look at before constructing their second and third maps, there were no strong differences between the two groups in the way the concepts were reorganised and changed in the second and third maps. For example, Elvina was presented with her previous maps and Shamalie was not, however, while their subsequent maps were reconstructed very differently, they both finally focused on the concept of *'learning'*.

One general trend over time was that the numbers of main concepts or hierarchies did not change markedly between the student teachers' first and second maps but then rose sharply between their second and third maps. There were an average of 2.6 main concepts in the first and second maps; however the third maps had an average of 3.5 organisational concepts. This could be because development of their deeper understanding about teaching occurred while getting more and more practical experience.

The overall number of concepts rose in a similar pattern with each progressive map. The average number of concepts in the first maps was 11.3 and for the second maps was 13.7. However, for the student teachers' third concept maps the average number of concepts rose to 19.1. Another

specific and noticeable trend was that the number of levels rose from an average of 2.9 in the student teachers' first maps to 3.5 in their second maps, then to 4.9 in their final concept maps.

One more obvious trend in the overview of how knowledge about effective teaching developed across student teachers over time is that the number of cross-links rose dramatically in their final concept maps. In fact, there were almost no cross-links in their first maps (average of 0.3) and this changed little in their second maps (0.7). Then the number of cross-links jumped to an average of 2.9 in their last concept maps. This increase in the number of cross-links suggests that the student teachers became more aware of the inter-relationships between the concepts involved in effective teaching. This clearly reveals that the complex relationships between concepts and sub-concepts became more apparent to the student teachers through their practical experiences. This is a strong indication that their understanding became deeper and more meaningful during the practicum periods and their reflections on them. This is also supported by the rise in the number of concept levels or hierarchies across all the student teachers' maps.

Importantly, while the role of the teacher was present in the concept maps at the beginning of the study in each successive map is associated with more sub concepts and relationships. The role of the students was not reported in the majority of the first maps. However, it was an important organisational concept in the map drawn the end of the student teaching period. All of the students had introduced it as a concept with sub concepts and interrelationships.

According to Cheek (1992) the learner's cognitive structure is based on their prior knowledge plus their personal experience, this may explain why all the student teachers' maps changed over time. This was particularly so with Piyal's and Kumar's maps; they seemed to discover during their teaching experience and through their reflection sessions that teaching itself was far more complex than they first thought.

As constructivist theory predicts, the student teachers appear to have constructed and reconstructed their own understanding and knowledge of effective teaching according to their practicum experiences and their reflections of those experiences. This probable active involvement in the process of meaning and knowledge construction (Gray, 1997) seems to explain why they broadened their original simplistic constructions of effective teaching significantly. The student teachers apparently became active creators of their own understanding by asking questions, exploring and assessing what they knew previously about effective teaching. In this study and in line with the above theory, the student teachers organised and reorganised their mental structures to accommodate their new understandings through the college reflection sessions and workshops as well as discussions with college lecturers, colleagues, mentor teachers, and experienced teachers at the practicum site. This is also in line with the view of Brooks and Brooks (1993) and Shepard (1991) who asserted that by reflecting on their experiences, learners generate their own meaning, which would explain clearly why the subsequent concept maps became more and more complex.

Moreover, according to Shulman's (1992) model of pedagogical reasoning, the student teachers appear to have undergone a transformation of how they organise their knowledge through reflecting on their practical experiences. They appear to have learned to transform theoretical knowledge into practical teaching through adapting several strategies such as preparations for adaptations and tailoring. For example, in this study in the student teachers' third maps they introduced concepts such as *teaching aids*, *relevant strategies*, *knowledge of students*, *teaching ability*, and *prior knowledge*. The student teachers' broader view of factors that are important for learning, such as knowledge of students, teaching ability, demonstrates that some change has occurred. That is, much of the theoretical knowledge expressed in their first maps has become more practical in nature.

As well as helping to understand how teachers' knowledge can be transformed Shulman's (1992) model also provides insights into how student teachers develop their understanding and skills through their practical experience in classrooms and the opportunities for reflection afforded by their workshops and seminars between student teaching periods. Shulman (1992) notes that practice assists teachers develop their knowledge about their students, and improve teachers' evaluation skills. Shulman's (1992) ideas also help to provide possible reasons for why the student teachers increased their understanding about the role of students, after reflecting on their own practice experiences.

Research question 2: What factors contribute to these alterations ?

To answer this question discussion is organised under the following sub-headings.

- Introduction
- Sources of changes
 - practical experience of teaching
 - student teachers' reflections
 - college effects
 - challenges experienced
- Summary

Introduction

The interviews with the student teachers provided insights to the rich contexts in which the changes in the concept maps took place. The interviews helped to reveal how the teaching experience and student teaching responsibilities influenced students developing knowledge. Each of participants' explanations about changes in their maps was coded into a category that represented a source of change: workplace experience, course experience, external influences, owns reflections, and others. The interview

data was analysed for each participant and for the whole sample within and across each time period as well as for each of the interview questions. The categories into which the interview data was coded was developed from the analysis of the interviews. Table 5.1 provides details about sources of these changes.

Sources of changes	No: of times
School experience Factors (21times)	
School environment	3
Principal	4
Mentor teacher	7
Other teachers	3
Parents	1
Others	1
School management	2
Reflection Factors (16 times)	
Own reflection	5
Critical analysis	3
Discussions	2
Reflection sessions	6
College Effects (14 times)	
Lecture	3
Lecturers	5
Workshops	6
Challenges Experienced (2 times)	
Positive	1
Negative	1
Own Parental Support (1 time)	1
Own Observation (2 times)	1

Table 5.1. Sources of changes cited by participants.

Sources of changes

Through the interviews the student teachers themselves provided some possible explanations for the changes in their concept maps. The main reason given for the changes they made to their maps was the impact of their practical experiences. (School experience factors in table 5.1) Included under school experiences were the support provided by the school (principal, other teachers, parents, students, and others). Other influences on the choices of concepts and influences on their knowledge of teaching

were factors associated with 'reflection' and learning from the college environment.

Practical experience of teaching

The main category of factors identified by the student teachers has been labeled 'school experience factors' and the factors highlighted by the participants were: school management, principal, mentor teacher, other teachers, parents and school management. There were twenty one (21) comments from participants which supported the conclusions that their student teaching experience was the primary source of the change. Four student teachers made comments about the influence of the school environment as a source of the changes. Typical comments are as follows:

While getting practical experience I reorganised my ideas about teaching... lots of my practicum experience, especially, the school environment affected my changes (Piya, in his third interview).

Five students cited the principal and seven said their mentor teacher was a source of the changes. For example, Malie explains in the following quote how she believes her knowledge was changed due to her interaction with her mentor teacher: *When I was participating in my practicum I got more experience from my mentor teacher... I changed my previous ideas. 'Other teachers' were cited by three students, 'parents' by Shamalie, and 'school environment' by Malanie as explanations for the changes in their knowledge organisation.*

Therefore, the largest number of reasons given fall into the general category of school experience factors, which includes reference to the student teaching environment, the principal, mentor teacher and other teachers as well as the way the school was managed. It seems reasonable to conclude that this research supports the notion that the main source of the student teachers' change of understanding about teaching was their student teaching experience. What is perhaps more surprising is the proportion of comments which were about reflection.

Student teachers' reflections

As Ho and Toh (2000) point out, teaching practice is not just an expression of professional knowledge. Other factors such as “student teachers’ personal attitudes, beliefs and goals” (p.2) also appear to influence student teachers’ understanding about teaching. This conclusion is supported by the experience placed by the students on reflection as the influence on their knowledge change. When the student teachers reflected their teaching these factors helped them to shape their understanding.

The second major category of sixteen responses given for their possible knowledge change was reflection. The factors in this category provided by the student teachers were: *own reflection* (cited five times), *critical analysis* (cited three times), *discussions with mentor teachers, supervising lecturers and colleagues* (cited two times), and *formal reflection sessions* (cited six times). For example, Kumar's statement below is a typical explanation of how the students’ own reflection resulted in changes in their conceptual knowledge: *As a result of these discussions, I reflected on my teaching, and I tried to change my knowledge and behaviour in the classroom.*

Such statements support the conclusion that reflection plays an important role in knowledge change. As Shulman’s (1992) points out in his *teaching cycle*, reflection helps teachers to review and be critical in analysing their own teaching in order to identify where they need to change to produce quality teaching. The importance of reflection to the students in bringing about changes can be seen in Elvina’s comment about the value of the formal reflection sessions: *Those reflection session experiences really, really helped me to change my ideas.*

College effects

The next category of reasons the participants provided for the changes was labeled 'college effects'. The factors in this category were: *lectures* (cited three times), *lecturers* (cited five times), and *workshops* (cited six times). Kumar stated that the college workshops were important for influencing his thinking about what makes effective teaching:

These workshops were very important to me to discuss my problems and reorganise my knowledge ... with my friends and lecturers, and you know, I gained more ideas from them. All those things affected me in reorganising my knowledge.

The important of the college workshops reinforce the role of reflection in assisting the students change their conceptual knowledge about teaching.

Challenges experienced

The last category of factors given by the participants as explanations for the changes was the challenges experienced during *the student teaching* (cited twice). An example of student teachers facing challenges during their practicum which resulted in them changing their knowledge comes from Nirmala. Nirmala explained that she experienced negative attitudes from teachers at her placement as well as a lack of resources

Sometimes those negative experiences ... other teachers' attitudes were a challenge for me. Much of the time I had to change my lesson and ideas. I took it as a good opportunity, because I can learn from it how to develop flexible teaching.

What is interesting here is how Nirmala has taken advantage of a negative environment to broaden her understanding of teaching. Since not all student teaching environments are positive, it would seem useful to provide students with the skills and flexibility to take advantage of the range of situations they are likely to encounter in their student teaching period.

Summary

A summary of the reasons the student teachers identified for changes in their understanding of teaching has been provided in this section.

In the next section, the implications of these themes will be discussed and suggestions will be made to improve teacher preparation courses, particularly focusing on the individual development of student teachers and their learning processes relating to good teaching. A number of recommendations as a result of this study will be made for further research.

Part Two-Recommendations and implications

Part Two of this chapter is organised under the following sub-headings:

- Introduction
- Implications and recommendations
 - the nature and degree of student teachers' relevant prior knowledge
 - the need for extending practicum
 - the value of reflection support programs
 - Introduction of teacher demonstration model
 - the need for closer examination of course content
 - the importance of the support of mentors
 - the need to develop strategies for application
 - the introduction of value of concept map
 - conclusion
- Directions for future research

Introduction

This section presents the implications and recommendations arising from this study. Suggestions will be made to help in the development and upgrading of teacher preparation courses generally, particularly focusing

on the individual development of the student teachers' teaching skills. Finally, this section will suggest directions for further research.

From this study, relevant and important implications can be drawn in relation to pre-service teacher education for Sri Lanka. A number of possible areas of development can be offered to improve teacher education. The main areas include: the nature and degree of student teachers' relevant knowledge before commencement of the student teaching; the need for consideration of broadening and/ or lengthening the student teaching experience; the value of reflective journals and reflective student support groups; the possibility of introducing a teacher demonstration model; the need for closer examination of course content in relation to the theoretical/ practical experience praxis; the importance of the support of mentors in the supervision process; the need to develop strategies for students to transfer the theoretical knowledge gained in their pre-service teacher education courses into practical situations; and finally, the value of concept maps for synthesising knowledge. Each recommendation is now discussed in detail.

Implications and recommendations

The nature and degree of student teachers' relevant prior knowledge

An area of further investigation relates to the degree of knowledge or understanding a pre-service student teacher requires before attempting the student teaching or field experience. This study highlights the need for students to be aware of the 'total' school environment, including the role of the school principal, other staff, parents, and outside community resources. Implications from the study call for increased knowledge about the wider school environment, as well as the role of the outside community in school decision-making. A recommendation would be to introduce student teachers to the school environment and community in which they would be undertaking their second year student teaching experience before commencing the formal student teaching period. This could be introduced

in an informal way. That is, students could be immersed in the school context through short and planned visits. Students would have the benefit of understanding the school setting through observation and discussion with school personnel. This would increase the probability of the students gaining a better understanding of the ‘big picture’ of the school context allowing for greater empathy for and understanding of all contributing factors and their inter-relationships.

The need for extending student teaching

One suggestion resulting from this study is to review, expand and implement the practical experiences for students enrolled in the teaching diploma course. In particular, the course could increase the number of student teaching days so that students could experience more ‘school life’, reflect on and apply the theoretical knowledge already gained in their course, and transform or transfer theoretical knowledge into the practical setting with the guidance of college lecturers, and mentor teachers. It might be help student teachers to integrate their knowledge into practice afterward in the year long internship period. Also, a workshop could be introduced which would help students translate prior theoretical knowledge into practical teaching skills.

An extension to the length of the time spent in school is supported by the findings of study by Loughran, Brown, and Doecke (2001). They found that the participants (student teachers) in their study “consistently refer (ed) to changes in their understanding as a result of extended teaching experience”. Loughran et al. (2001) states that learning about teaching in teacher preparation programs needs to be explicitly linked with classroom experience, and that “this practical experience can purposefully inform student teachers’ learning about teaching through an enhanced emphasis on the need to know” (p.20).

The value of reflection support programs

Another important finding of this study related to the level and importance of reflection undertaken by student teachers during the student teaching experience. The introduction of journal writing during the student teaching period may be another way to develop student teachers' reflective understanding about teaching. Reflective journals and reflection sessions could be introduced during the student teaching to help students make more reflective conceptual connections in their teaching. As suggested by the results of this study and by the literature (e.g. Shulman, 1992; Kwo, 1996; Groundwater-Smith et al, 1998) reflection sessions and reflective journal writing can help enhance student teachers' insights into their own teaching. Journals are highly rated as a means of facilitating reflection, influencing the integration of theory and practice, stimulating student teachers' critical thinking and high levels of learning (Bain, Ballantyne, Packer and Mills, 1999). Bain et al. (1999) identify student teacher reflections as an important part of their development process. These authors also found that initially student teachers' ability and willingness to devote themselves to their reflection journals was the best predictor of their final performance (Bain, et al. 1999).

Another process to enhance the reflection process would be the introduction of more colleague-group reflection sessions where the student teachers come together before and during their student teacher periods. This study demonstrates the impact of the group reflection sessions as having a significant effect on changing student teachers' understandings. These sessions can be a time for instruction and modeling of the kind of teaching preferred. The student teachers in this study were able to engage in thinking and acting according to preferred models of teaching through reflection. As a result of its success in this research project it is highly recommended that this process becomes a mandatory component of pre-service teacher education courses.

Introduction of teacher demonstration model

Demonstration teaching is another highly recommended strategy to improve pre-service teacher education. Experiencing demonstration teaching before and during the student teaching period, the student teachers can provide an avenue to develop and refine teaching skills in a formal classroom situation. It provides teacher trainees with practice sessions in a real but safe teaching environment under the guidance of their supervisor or mentor who can give detailed feedback on their teaching performance. This idea was promoted by the student teachers interviewed. Some of the participants especially emphasised the need to learn and understand the concept of '*good teaching*' prior to starting the practicum. The demonstration teaching idea is highly supported by most of the teacher preparation programs at various universities in a number of the states of America (Kudaligama, 2001). It is recommended that a number of schools identified as quality institutes in the area of teacher education should be targeted as 'demonstration schools'. Additional funding would be required to establish such schools of excellence.

This idea of demonstration teaching leads to an additional suggestion concerning the assignment of college supervisors to pre-service teachers. Each student teacher's progress towards becoming competent in the necessary teaching skills could be assessed by their college supervisors who should also provide detailed, ongoing assistance. The skills that require attention would be pointed out to the student teachers and specific help and follow-up would be offered by the college supervisor. This notion is strongly supported in the relevant research literature. For example, Hebiton, Yukich, and Keegan (2002) found that closer assistance from university supervisors who provide detailed feedback was very important for student teachers, especially during their practicum period.

The need for closer examination of course content

Another suggestion arising from the results may be to examine closely the course content, including to determine whether opportunities are provided for developing student teachers' understanding of their pupils before

entering student teaching. In this study it was evident that the participants focused more on 'teaching' as a concept rather than 'student learning'. There was a perception that effective teaching would result as the teaching role developed. A greater understanding of the role of the learner, learners' behaviours, and learning patterns is required before attempting the practical component. This should be beneficial so that the shift of from being teacher-centered to becoming student-centred would be evident earlier in the course. Therefore, it is suggested that more classroom observation and more practical micro teaching experiences which involve a focus on the students (e.g. individual observations) should be introduced before the student teacher period commences.

The importance of the support of mentors

Many of the participants in this study recognised, commented on, and acknowledged the important role of mentor teachers, as well as the broader school environment, in their knowledge construction process. It appears that when participants met well organised and positive school environments and excellent, experienced mentor teachers, they developed greater understanding about teaching. This raises questions about how important it is for student teachers to understand the influence of the school environment and to communicate with experienced mentor teachers about the process of learning to teach. As Figure 2.2 shows there is a support system in place for student teachers' development in the existing system. However, at the moment this system does not function as effectively, as it might because of the lack of facilities and high quality professionals. Therefore, it is suggested that a well organised school, including a good principal, experienced and excellent teachers, should be selected for mentoring student teachers while on practicum. This notion of experienced mentor teachers is strongly supported by Murray, Mitchell and Dobbins (1998). These researchers confirm that a mentoring program for beginning teachers can be a valuable form of school-based professional development experiences. In particular, successful mentors encourage student teachers to reflect on their own teaching assumptions, beliefs and practice. Thus, good

“mentoring may be a valuable means of promoting reflective critical practice, so widely acknowledged as an essential element of effective teaching" (p.26). This practice is also supported by Hebiton, Yukich, and Keegan (2002), who conclude from their research that “the role of the co-operating teacher during field experience was clearly seen to be one of mentor, role model and advisor, who should guide and monitor the student teachers" (p.1). The NCOEs should therefore develop a database of effective teaching environments and quality teachers for mentoring students within teacher education courses in Sri Lanka.

The need to develop strategies for application

It is obvious from the results of the study that there was a relationship between the theoretical and practical components of the pre-service courses. This study recommends the introduction of a special component in preparation courses to assist student teachers in applying theoretical knowledge gained in their course to their practice. The student teachers in this study went through a process of transforming their theoretical knowledge into the additional concepts necessary for effective teaching by reflecting on their practical learning experiences. Close examination of teacher education course content is required to analyse the role that theoretical knowledge has in the practical process of teaching. From the study it can be concluded that the students here acquired a certain level of theoretical knowledge about effective teaching while involved at the college level but that this theoretical knowledge was developed and extended significantly when the students engaged in practical experience. It is apparent that students require additional activities or experiences to strengthen their content knowledge and transfer their theoretical learning to practice.

The introduction of value of concept map

Another interesting result of this study was the role of concept map development and its impact on the student teachers' development.

Although the concept map was initially used as a data gathering device, the development of three concept maps over a period of time provided opportunities for students to analyse, reflect on and synthesise their knowledge about teaching. Therefore, it could be recommended that concept map drawing be introduced as a tool for analysis and reflection within and following the student teaching period. According to Loughran, et al. (2001), this process of reorganising knowledge using concept maps during teacher preparation programs needs to be explicitly linked with the student teachers' beginning years of teaching. Therefore, it is suggested that concept map drawing and analysis be introduced step-by-step before and during the practice teaching period to provide additional insights and skills required by effective beginning teachers.

Conclusion

The results of the research conducted for this thesis confirm the findings of existing literature (e.g. Dobbins & Mitchell, 1995; Blunden, 2000; Brandanbury & Ryan, 2001) and provide detailed evidence from the changes in students concepts maps for the importance of student teaching experience in student teachers' knowledge construction. To expand and develop student teachers' greater understanding of teaching and its complexity, and to produce more effective and efficient teachers, it is suggested that, it is important to introduce a longer-term student teaching. Most of the participants (student teachers) here stated that they needed have more opportunities to practice their theoretical knowledge in order to gain more understanding about effective teaching. This could overcome the criticism that teacher education programs are too disconnected from practice. Kyriacou and Stephan (1999, cited in Kudaligama, 2001), evaluated student teachers' concerns during teaching practice using focused group interviews. They found that student teachers 'wanted to get stuck into teaching' earlier and to have a longer or more practicum, and that trainees developed most of their confidence to teach during their practicum (Kyriacou & Stephens, 1999, cited in Kudaligama, 2001). This confidence

was perceived to have come from their direct experience of what worked for them when they were actually teaching. Therefore, employing a longer student teaching period is another suggestion to improve the pre-service program for more effective teachers. As a result of this study it is recommended that a three-month student teaching period could be an optimum time, with all the benefits in term of student teachers' knowledge, understanding, confidence and teaching effectiveness indicated here. The combination of all of these proposed changes to teacher education courses will strengthen and improve the quality of the teachers being trained in Sri Lanka.

Directions for the future research

The study has produced a number of suggestions or directions for further research in relation to pre-service teacher education in Sri Lanka. Several related areas still need to be researched more thoroughly to provide useful data for change. Firstly, more specific attention is required concerning how individual teachers develop their knowledge both in the area of pedagogy and content. Also, a proposed definition for what constitutes good or quality teaching in the Sri Lankan context requires more refinement. Research is also required to determine how to develop pre-service teachers' existing and developing knowledge. Strategies could be identified in further studies, which further explain the area of and promote development in effective or quality teaching.

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Appendices

Appendix 1: A copy of ethical approval

Appendix 2: Consent form for NCOEs authorities

Appendix 3: A copy of information sheet

Appendix 4: Consent form for participants

Appendix 5: Structured interview questions

Appendix 6A, 6B, 6C: Sample concept maps of the final study

Appendix 7: Sample interview data of the pilot study

Appendix 8: Sample case study of the pilot project

Appendix 9: Sample interview data of the final study

Appendix 1: A copy of ethical approval

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

Please see print copy for:

Appendix 2: Consent form for NCOEs authorities

Appendix 3: A Copy of the Information Sheet

Appendix 4: A Copy of the Consent Sheet

Appendix 5: Structured interview questions.

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

Appendix 6A: Sample concept map of the final study (Sarath's first concept map)

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

**Appendix 6B: Sample concept map of the final study
(Sarath's second concept map)**

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

**Appendix 6C: Sample concept map of the final study
(Sarath's third concept map)**

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Photo - JPEG decompressor
are needed to see this picture.

Appendix 7: Sample interview data of the pilot project.

Venue: University of Wollongong (Beginning of the student teaching).

Participant : Harry

***Q1:** Firstly I felt effective teaching is about being able to show children how to learn. Skills... but this is not possible with out effective behavior management, And... For that to take place you need to know your students ...*

And ... know what works for them.

Secondly I thought about what it is that happens in the class.

What student does, behavior wise, Interacting, ... learning etc....

And thirdly I thought what it is that we teach them,

It needs to be worthwhile have a purpose and the children need to see this relevance ...

And where they can use the skills in real life etc...

Fourthly student really needs to be shown how they can develop

And foster their own learning skills, strategies,

So they can become more independent in their learning.

And other thing... schooling is very much about socialization...

Learning how to get along with others,

What is appropriate? But I figure all of these points are very interrelated

And cannot happen independently of one an other.

***Q5:** What I have seen in practice both at school and at lectures and tutees etc....*

A lot of this comes more from talking and reflecting with teachers and peers rather than at uni...

Although at uni they do tend to push their same ideas.

A lot of it comes from de –briefing about what we have experienced,

Reflecting with others.

***Q6 / Q7:** The top their points are all equally important*

And. I don't feel one point can take place without other two interacting

Participant 2: Lisa

Q1: *I feel that effective teaching can be broken down into a number of sub heading, ... the first of all are Key learning areas, we call KLA's and needs of ... classroom management, practices and perspectives*

The kla's are what we are required by the state government to teach our students.

These are most effectively taught in a way that integrates them as much as possible

And ... caters for the variety of learning styles presented in the students.

As teachers it is important that we strive to meet the needs of our students, schools, community, and ... the state government.

All our student display individual strengths and weaknesses ...am... and interests

And these affect the way they learn, and how they behave in the class.

The classroom management and practices employed by the teacher affect the way the class operates

And the amount of work they are likely to complete effectively.

Good classroom management also helps to ensure the safety and well being of all students in the class.

Finally, teachers should strive to ensure they include all teaching perspectives in their lessons.

The perspectives are an important part of student's moral education and

Skill development and ... are highly beneficial.

Q2.- *Combination of university studies, personal beliefs and ...*

Results of what I have seen on past practices

Map 2

Participant: Harry

Q1: *my concept map is based around my experience at public school.*

This particular school has a lot of behavior problems and so emphasis is on student behavior management. I feel that in order to be effective teachers at this school I need to have this factor well under control, before I can begin to teach these children. I also need to have a certain understanding of the special needs of the students in order to know what and how to present and teach material to the children. Each key point is dependent on the other points. I cannot do one without the other in play.

Q2: *yes,*

Q3: *I included time management and more about being able to 'show' children how to learn skills for themselves. I also thought more about the students needs.*

Q4: *managing time and behavior needs are what I now see as relevant and important factors in effective.*

*Experience and discussion with other teachers lead to my changes
Other teachers, and from reflecting on my own teaching practice.*

I think they are important because they more accurately reflect what I feel make an effective teacher.

Teaching practice and discussion with other current teachers. Reflecting on what works and what did not work.

Q6: *Behavior management*

Q7: *because of the school's feedback and because of the students. It has a lot of behavior problems and in order to teach the children, they have to be focused and listening, then they need to be on task. media influence on children.
because I have least control over it.*

Appendix 8: Sample case study of the pilot project

Harry's case study

Harry is a 26 years old, novice student teacher whose only experiences in school prior to his practicum have been gained experiences on model teaching, microteaching and classroom observation. He has derived most of his theoretical knowledge about teaching from the methodology and other subjects in his diploma course and through his processing of his own schooling.

Harry's first concept map of effective teaching which he had drawn before his student teaching period, includes three main organizational concepts; behavior management, skills and the students. Under 'behavior management' cluster are the concepts of 'students needs' and 'appropriate behavior'. The concepts of 'students needs' are able to pre -empt problems, which minimises student stress with 'teachers and others'. The concept of appropriate behavior leads to modeling 'teachers and others' as well as modeling their 'academics and social situations'. Under the cluster of skills is the 'topic and lesson aims'. According to Harry, a teacher must know enough of the 'topic' and know the 'lesson aims', which gives students skills and suitable knowledge. Skills enable the students to handle their academic situation and social situation according to Harry's interpretation of his first concept map. Under the "student' cluster are the welfare and learn concepts; what provides welfare and understanding how student learn. Understanding how student learn is also linked to the concept of "suitable knowledge', which Harry put under the 'skills' cluster. Harry's first concept map had seventeen concepts related to effective teaching, eighteen relationships between two concepts, five cross-links between two clusters and five hierarchies.

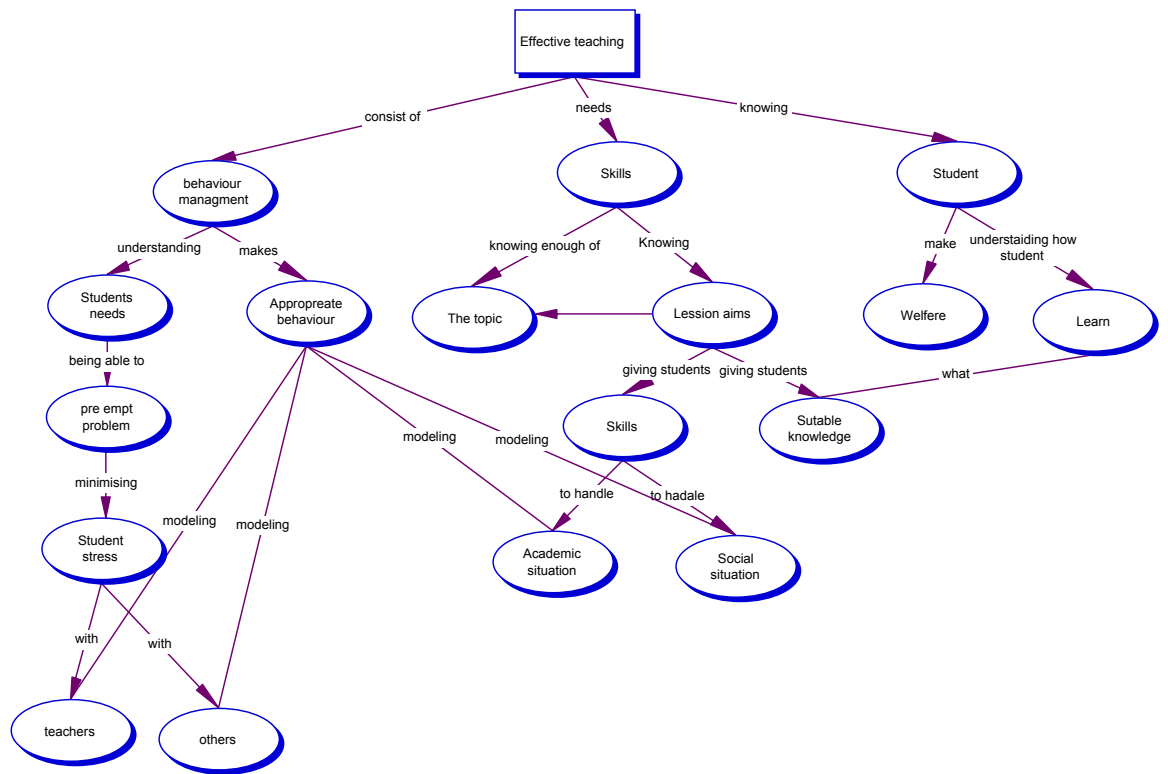


Figure 1. Harry's first concept map

In the first interview with Harry he explained that the three organisational concepts were of equal importance in effective teaching. His idea was that effective teaching was about being able to show children how to learn, however this was not possible without effective behavior management. This is demonstrated in his first concept map as 'students needs' and 'appropriate behavior' came under the cluster of 'behavior management'. Moreover, the 'appropriate behavior' concept was linked with 'teachers and others' in the same cluster as well as both the 'academic and social situation' under the skills cluster. Another important idea Harry had concerned what actually happens in the class; what the students do and how they interact and learn. Harry also considered that what was taught needed to be worthwhile and have a purpose. Harry argued that children needed to see the relevance of what was taught and where they can use the skills in real life. Also, he claimed that students needed to be shown how to develop and foster their own learning skills and strategies in order to become more independent in their learning. This idea is revealed in

his first concept map by the cross link between the cluster concepts of 'skills' and 'students'.

According to Harry's description and explanation of his first concept map, his ideas come from what he had seen in practice at both school and at lectures and tutorials at university. Many of his ideas were reported by him to come from talking with teachers and peers and reflecting upon those conversations rather than from his university experience.

Harry's second concept map is based upon his placement at a school that had a particularly high rate of behavioral problems.

My concept map is based around my experience at... Public school.

This particular school has a lot of behavior problems and so emphasis is on student behavior management.

In his practicum he developed a new concept map, in which he emphasized student behaviors. This is possibly due to the number of students with behavioral problems in his placement school.

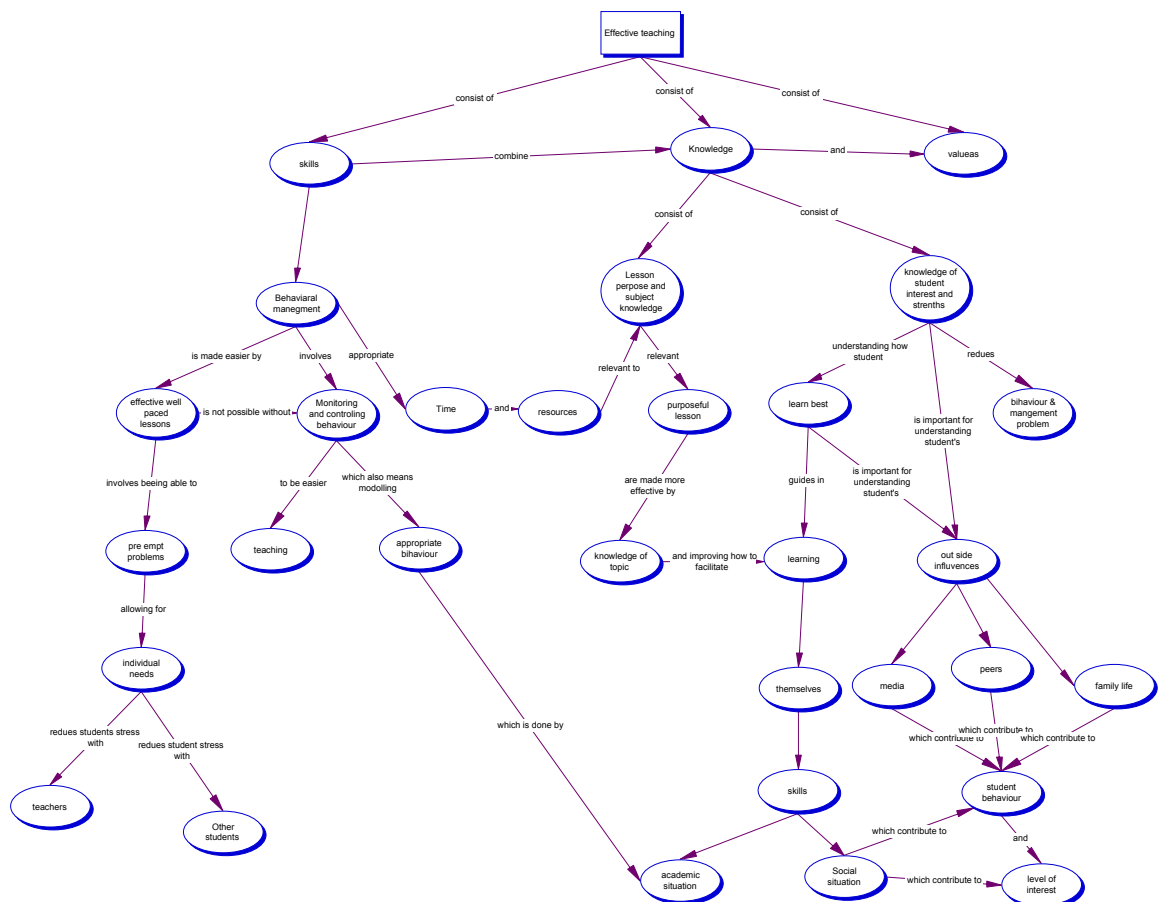


Figure 2. Harry's second concept map

The second concept map also consists of three organisational concepts; skills, knowledge and values. In his second concept map he deleted two organisational concepts; behavioral management and student, and added the new concepts of 'knowledge' and 'values'. Also, the organisational concept of behavioral management in the first concept of behavior management in the first concept map was placed under the organisationl concept of skills in the second concept map. Harry's new idea was that behavior management is made easier by effective, well-placed lessons. 'Behavior management' now also involves monitoring and controlling behavior, otherwise effective well-placed lessons are not possible according to Harry. Effective well-paced lessons involves being able to pre-empt problems. Pre –empting problems in turn allow for individual needs, and individual needs reduces students' stress. This is achieved with teachers and with other students.

Under the new organisational concept of 'knowledge' is the two concepts of 'lesson purpose' and 'subject knowledge', and 'knowledge of student interest and strengths'. Lesson purpose and subject knowledge is relevant to the 'resources' concept as well as the concept of 'purposeful lesson'. The purposeful lesson is made more effective by knowledge of the topic and is further linked to the concept of 'learning', which is under 'knowledge of student interest and strengths'. Knowledge of student's interest and strengths leads to understanding how a student learns best. According to Harry it also reduces 'behavior and management problems'. Understanding how a student learns best guides in learning.

Under learning in Harry's second concept map is the concept of the students learning by themselves, which provides them with skills to handle both academic and social situations. The concept of academic situation is cross-linked to the 'appropriate behavior' concept under the organisational concept cluster of 'skills'. Furthermore, social situation is cross-linked in Harry's second concept map to both 'student behavior' and 'level of interest' under the concept of 'outside influences'. Under outside influences in the knowledge

cluster are media, peers and family life. All these three concepts contribute to student behavior, along with the student's social situation. Finally, in Harry's second concept map, both 'social situation' and 'student behavior' are linked to the 'student's level of interest'. Harry's second concept map had twenty-nine concepts related to the topic, thirty-six relationships six cross-links between one cluster and other cluster and eight hierarchies. He increased the number of concepts, relationships, cross links and hierarchies related to the topic rather than the number of concepts of his first concept map.

According to second interview with Harry, all of the new ideas about what make an effective teacher come from his practicum experience. Harry stated that in order to be an effective teacher at the placement school he needed to have the behavior factor well under control.

I feel that in order to be effective teachers at this school I need to have this factor well under control, before I can begin to teach these children.

This may be the reason why the 'behavior management' theme is more developed in his second concept map. He explained that he should have the behavior management factor under control before he could even begin to teach those children. He also argued that he needed to have a certain understanding of the special needs of the students in order what to know to present and how to present and teach material to the children.

I also need to have a certain understanding of the special needs of the students in order to know what and how to present and teach material to the children.

This idea is shown under the lesson plan and subject knowledge concept in his second concept map, which is linked with purposeful lesson and resources, and time, cross-linking it with behavioral management under the skills cluster. He concluded that "each key concept is dependent on the others", that he could not achieve "one without the other in play". The cross-linking of all Harry's organizational concepts together in his second concepts map can see this idea.

Skills are combined with the other cluster concept of 'knowledge and values'. Harry specifically identified this reason for these changes in his second interview as being the result of his practicum experience, his discussions with other teachers, and reflecting on his own teaching practice. He emphasized that these changes now more accurately reflects his idea of what makes an effective teacher. This is his stated reason why his idea of effective teaching now includes more factors on behavior management.

From the above discussions with Harry it becomes obvious that his placement has influenced the way he understands effective teaching

In his interview before his first practicum period Harry explained that for him effective teaching was about being able to show children how to learn, behavioral management, and developing the students' skills. To achieve this a teacher needed to know the students and know what works for them. Indicating the three organisational concepts at the top of his concept map, Harry explained his choices as follows:

Firstly I felt effective teaching is about being able to show children how to learn. Skill (...) but this is not possible without effective behavior management (...)

And. For that to take place you need to know your student (...)

And (...) know what works for them.

Harry said that he believed these three organisational concepts; 'behavior management', 'skills', and 'students' were equally important and that one could not occur without the other two interacting.

Each key point is dependent on the other points. I cannot do one without the other in play.

However, this idea is not shown on his first concept map, there is no cross-linking of these organisational concepts. Harry also explained that what students are taught needs to be worthwhile, have a purpose, and that the children can see how it is relevant to real life. His expressed thoughts were that

students really need to be shown how they can develop and foster their own learning skills and strategies so that they can become more independent in their learning.

I thought about what it is that happens in the class. What student do, (...) behavior wise, Interacting, (...) learning etc (...) And I thought what it is that we teach them, It needs to be worthwhile have a purpose and the children need to see this relevance (...) And where they can use the skills in real life etc.

However, this idea of independent learning is not expressed. Harry thought that schooling was also 'very much about socialization', learning 'to get along with others'.

All of these concepts in the first map under 'behavior management, skills and students' were considered by Harry to be integrated and unable to happen independently of each other. Harry formed these ideas from his school life, at lectures and tutorials as a student teacher, his experience and his own reflection.

What I have seen in practice both at school and at lectures and tutees etc. (...) A lot of it comes from de-briefing about what we have experienced. Reflecting with others rather than uni.

These reflections from his educational experiences and interactions with others formed Harry's beliefs and ideas before his practicum about what makes on effective teachers.

Because Harry's practicum period was at a school with many behavioral problems, afterwards he developed the new concept map that had more emphasis on student behavior management. When explaining the changes in his second concept map, he now states that in order to be an effective teacher he needs to have this factor well under control before beginning to teach. The special needs of the students need to also be understood in order to know what

and how to present and teach material to the children. In Harry's explanation each concept is still dependent on the others and one cannot be accomplished without the others in play.

Some important changes were revealed by a comparison of Harry's two concept maps. Harry included more concepts about time management and about being able to 'show' children how to learn skills for themselves. In his second interview, Harry emphasized that these changes were made because time and behavior needs were now considered by Harry to be relevant and important factors in effective teaching. Harry added many more concepts about knowing students' interests and strengths, which is important for understanding how students learn, their outside influences, and to reduce behavior and management problems. He added the concept 'outside influence' concepts that were added include the media, peers, and family life, which all contribute to student behavior, their level of interest and their social situation. According to Harry by understanding how students learn best, the teacher can guide student's learning by showing them how to learn by themselves and develop their own learning skills. He explained that this in turn would achieve a better academic situation for students as well as improve their social situation.

Another organisation concept that Harry added after his practicum period was 'knowledge'. The 'knowledge' organisational concept was not only linked to 'knowledge of students and strengths' as discussed above, but also of 'lesson purpose' and 'subject knowledge'. In Harry's second concept map this 'knowledge' is cross linked to the concepts of 'resources' and a 'purposeful lesson', which he feels is made more effective by 'better knowledge of the topic' and improving how to facilitate 'learning'.

Before his practicum, Harry commented that behavior management only included the concepts of student's needs and appropriate behavior, which is also evident in the second concepts map. However, in the second concept map, behavioral management concepts included effective and well-paced lessons, which in Harry's opinion is not possible without monitoring and controlling

behavior as well as appropriate time and resources relevant to the lesson and subject. He explained that the concepts of monitoring and controlling behavior also means that teaching will be easier as well as modeling and appropriate behavior, which is achieved by a sound academic situation.

In Harry's first concept map the cluster concept of 'behavior management' and 'skills' were separate, however in his second concept map these concepts were together but under 'behavior management', which was under the cluster concept of 'skills'. This is a significant change in cognitive organization and therefore shows that Harry explored and reflected on this idea more thoroughly during and after his practicum experience.

Moreover, in the second concept map, all cluster concepts are linked together, showing that he understood their relationship to each other. This cross-linking of concepts is much more obvious in the second concept map. For example, the 'appropriate behavior' concept after Harry's practicum is now linked with the 'students academic situation' in the cluster of 'knowledge' concepts, which is linked with the students values at the cluster concept level. While Harry expressed this idea of interrelatedness in the first interview, however it was not shown in his first concept map. After his practicum this idea was clearly shown in his second concept map.

The sources of these changes in Harry's second concept map apparently came from his practicum experience, other teachers, and reflection upon his own teaching practice. It seems that discussions with other teachers lead to many changes in the organization of Harry's teaching concepts.

Experience and discussion with other teachers lead to my changes(...)

Other teachers, and from reflecting on my own teaching practice(...)

Reflecting on what works and what did not work.

These changes reveal how important it was for Harry to reflect on his own teaching practice, as his practicum significantly changed what he explained made an effective teacher before he gained teaching experience. Therefore, the

concept map made after teaching experience may more descriptively demonstrates that Harry has been thinking about the components and relationships in the cognitive organization of teaching. Harry has shifted his thinking about what makes an effective teacher, because Harry experienced first hand what works and what does not work. According to Harry this knowledge was gained from his reflecting upon the school's feedback and from the students and not so much on the formal university learning experience. Because, there were many behavioral problems, Harry said he realized that in order to teach the children they must be focused and listening and remain on their task. He also acknowledged that there are many factors in the teaching situation that he has very little control over, such as the media influence on students. Therefore, Harry now state that effective teaching needs to be much more flexible than he formerly believed, as many concepts are integrated and have significant influence on each other. Harry expressed that concept mapping has been very useful and may be helpful for him to externalize his reflection, thinking, and the way he is starting to organize his ideas. Thus, concepts maps can be an explicit research tool for the organizational model and how it is externalized.

Summary

Harry's particular case study is one example that shows how pre-service teachers cognitive organization can change after their student teaching period. According to Harry the changes made in his second concept map come about from reflecting on his practicum and university course experience as well as interaction with peers and teachers. Represented hierarchies, cross-links, relationships and example played a very important and useful role in describing Harry's creative thinking while producing his concept maps. By comparing such concept maps before and after teaching experience it can be seen how Harry's concepts of teaching can change according to his real life experience in the work place.

Appendix 9

Sample interview data for final study

Nirmala

Background

I am Nirmala. 24 years old. Mathematics student teacher. I love my profession. It might be because of my parents.

You know, my parents were teachers, so too was my sister. And, I can remember living at the school quarters when I was a child. I saw my parents work very hard at the school, which I found very interesting.

I spent my secondary schooling time at ...private school. It was a very important and enjoyable time in my life.

You know, I participated in lots of extracurricular activities. It might have helped me to develop my personality. That school maintained good academic as well as disciplinary states.

I would like to tell you something about my teaching diploma course. I love this. I gained more from the course. Lots of theoretical knowledge. Some practical knowledge. Anyway, so far, I got only limited practical experience through classroom observation, practice teaching. Anyway my course subjects, like Element of Education, Teaching as a Profession, and Education Practice, gave me lots of theoretical knowledge.

My opinion is that effective teaching requires knowledge, attitudes, skills as well as training. Other things are knowledge about classroom management and about students.

An important thing is teachers must have professional training, because, they need several things.

(18th January, 2003)

Map1

Q1- *On my understanding, properly trained teachers know how to manage their class and students, you know. If teachers know their students well then they can manage and guide them well.*

They could have good knowledge, skills and attitudes about their teaching.

The second thing as a teacher you must have a good attitude about your teaching, about your students, and you can get it from your training. If you have good attitudes about your students and their learning you can guide them very well. So, then you are ready to teach, ready to help to your students, ready to guide them. Then you can present a good lesson.

Through this you can change your students' behaviour. It is sometimes long-term or established. And, if you can present a good lesson, it can change students' attitudes as well as knowledge. These are the main goals we try to achieve from our lessons.

Next, a good teacher has more skills in the teaching-learning process including several teaching and learning strategies. You know your good teaching ability helps you to present effective teaching. I can say all these issues combine together.

Q5- *My schooling experience, and sometimes my parents affect my theoretical knowledge and the little practical knowledge I gained from my course may affect how I draw this map.*

Q6- *The most important concept of this map is training, because all those things that I told you can develop from your training.*

Q7- *Without proper training you can't get skills, knowledge. Through your training you can develop your attitude also.*

I believe that properly trained teachers have knowledge, skills and good attitudes towards their teaching, but without proper training they will not have these attributes.

Look, I have placed here 'skills' concept, because teachers need skills such as strategies, without which it is difficult to develop .

(18th January, 2003)

Map2

***Q1-**I can remember I mentioned at my first concept map drawing that good professional training helps our effective teaching. Through this training you can get knowledge, skills and attitudes. So, I placed these personally.*

As a teacher you should have a good knowledge, positive attitude and relevant skills for your teaching. You can get these things from your training.

You can see here I placed skills, because, teachers need skills such as strategies. Successful teaching requires teaching and learning strategies, without which it is difficult to develop. Attitudes should be positive otherwise teachers cannot develop their teaching.

This knowledge consists of theoretical and practical knowledge. You know what this practical knowledge is: the knowledge, relevant to your teaching role. For example, knowledge about classroom management, knowledge about student management and knowledge about their school environment. Unless teachers have good subject knowledge and know how to evaluate student learning, they can't practice effective teaching.

A good teacher maintains good classroom management, especially a good learning environment within their classes. If you can maintain good classroom management, that means you can manage your students, you can manage your lesson well.

Now let's see theoretical knowledge. You should have a good theoretical knowledge about your subject. This is not only the subject knowledge. But also you need to have good evaluation knowledge. This knowledge may help you to evaluate your students, and your teaching. Unless teachers know their subject and how to evaluate students and their work they are poor teachers.

***Q 2 / 3-**Here I placed 'positive attitudes', and under the concept of knowledge I developed more concepts: theoretical knowledge, practical knowledge, subject knowledge, evaluation knowledge, classroom management and student management.*

I already explained why I placed those concepts,

You know, the skills concept is also important. Under this I placed two more concepts.

As I mentioned earlier you should have good skills. It includes good learning strategies and good teaching strategies. The good teacher uses various types of strategies for their classes and they should be suitable to the school and classes. Effective teachers require teaching strategies and learning strategies skills. Finally, I can say if you want to be a good teacher, you need to know what you teach, how you teach, and when to teach, and you have to consider your teaching.

If you can evaluate your teaching, you can develop it yourself.

Q4-*I thought I had already explained those.*

Q5 -*My practicum site was not a good one. No facilities. Not only that I did not get much motivation from them. That school had no good management or even a good principal. So, it was a very hard experience for me.*

Anyway, I got some experienced teachers' guidance. I discussed lots with my mentor teacher and other teachers. Finally I reflected on my own experiences. The results of this discussion helped me to organise my knowledge.

Q6 / 7 –*I thought all these concepts are very important, because without one or two it can't properly work.*

(1st February, 2003)

Map 3

Q1-*Just training can't make a good teacher. You should be a creative teacher. Creativity is a very important factor. A creative teacher can make a good learning environment within the classroom, which helps student learning.*

If you have good training and experience, I believe that you have sound knowledge and good attitudes and skills for your teaching. These things help to present a good lesson.

Good teachers have good attitudes about their student and their own teaching. Then you can give support to your students.

What are these skills? The concept of skills highlights learning skills and teaching skills. In good teaching we can see good teaching skills as well as good learning skills.

If you can maintain a good learning environment within your classroom, it is the way to develop good teaching. For that you need those skills. In that case, you can understand your students' learning styles and learning strategies. So then you can give your fullest support to them. You can improve them.

In the end, as a good teacher you must present relevant and suitable lessons for your students and your classroom, so you need to be flexible.

Other very important things are the classroom and school environments.

If the school and the classroom environment are not suitable for learning, you can't present a good lesson, because these things affect your lesson. In that case, you would have to be concerned about other things rather than doing your teaching.

You should be deeply concerned about your students, because they are the only living things in your class that affect your teaching. Whatever you teach directly affects them.

As a good teacher your lesson must be relevant and suitable for your students and your class. So, that's why you need to be flexible.

Here I placed the concept of practical knowledge. It is a very important component, because it involves most of the things that you should have, to act, including management knowledge and knowledge about your students and the classroom.

You can gain your practical knowledge from your experience.

Another important thing is if you want to present a good lesson you should be concerned about your students. Because students are the most important and the living things in your class.

Q 2/3 – *Lots. Especially one new organisational concept, here 'school environment', and I developed many more concepts under the 'skills' concepts, and some under the 'knowledge' concept.*

I realised good teaching is aimed to develop our students' learning. That is why all those concepts finally focused upon the students, meaning their development and improvement.

Q4-I developed my previous concept map through my experience. When I was getting more and more experience I realised what teaching was. So, that is why I added those things. Now I have realised effective teaching consists of several things.

You know, when I was getting my practicum experience, I changed my previous ideas, but I want to say good training and experience help to present a good lesson.

Q5-I got lots of ideas from my practicum experiences. It might have directly affected my changes. Anyway, you know, my practicum site was not a very good one. Really, school management was worst; no proper plan. The principal failed to do it.

And most of the teachers' and parents' attitude were also not good for students' learning. Most of the teachers there didn't want to do their job well. They just come and go. I don't know why! Students were also the same. It might be that teachers' attitudes affected them.

They were really not ready to learn. It was genuine, because no one cares about his or her study. So how can you make a good learning environment there?

So then, how can I teach well? Can you imagine? It was terrible. Anyway, I tried to do my best, but results were very, very little.

After I finished my first practicum phase I spent three weeks at my college. Meanwhile I got an opportunity to participate in three reflection seminars. There, we discussed many things relevant to my teaching with my colleagues and lecturers. A very interesting parts were the that reflective thinking and problem solving sessions. We reflected on our experiences when we participated in those sessions.

So I gained much more understanding and I tried to apply that knowledge when I was doing my second practicum phase. Through those reflections I developed

more concepts; for example, school environment, because if the school and classroom environments are not suitable for learning how can you present a good lesson?

When I participated in college reflection sessions, we discussed all these things, and I realised what teaching was. And most of my colleagues gave me more ideas.

Thank God, those reflective experiences were very useful to me.

So, my own reflections affected me to change my knowledge about teaching.

When I faced the real situation I could understand my roles better.

I believe that practicum is a very effective strategy to develop our teaching.

When you are getting more and more experience you eventually realise what teaching is about. But my practicum site was not really good. I got more negative experience rather than good experience.

Anyway most of my colleagues told me that they got very good experience from their practicum sites.

An important thing is, if you can arrange a rotating scheme for the practicum, that means school-by-school for different phases of the practicum, it would be very useful and effective. Because, we can gain different experiences from different sites.

Q6 / 7-*Really, I can't say because all these concepts are equally important. Any way I thought 'students' may be a prominent one.*

Q 8- what do you think about the research method, that is the use of concept map? *Really, this research method was very interesting.*

That was my first experience with concept map evaluation. It really worked. I myself tried to use this method to organise my knowledge. I really appreciate this method, because we can see our development and changes initially.

And we can see how we changed our knowledge during the practicum period.

I will also try to apply this method to my future studies.

(3rd March, 2003)

Piyal

Background

I am Piyal. I do mathematics major, and I am 24 years old.

I want to say I come from a very rural area. Our area had a lack of facilities. Not enough water supplies. No electricity. Even my school had not a lot of facilities, not enough buildings, or resources, even most of the time a shortage of teachers. So we faced more and more difficulties. When I was in advanced level those things were affected me in continuing my studies.

Unfortunately, not only that, the teachers who taught to us did not have good professional skills. So, it affected my study.

Anyway, I got through my exam, but was unable to attend the university, because I had not enough marks. So, I decided to enter the teachers college and become a good teacher, because I learned from my secondary school teachers.

I tried to get some understanding and knowledge about teaching from my course. I got little practical experience from microteaching, classroom observation and practice teaching.

(18th January, 2003)

Map 1

Q1-*The combination of theoretical knowledge, practical knowledge and human resources make effective teaching. So, I placed those concepts as main concepts in my map.*

Under these three concepts we can extend more ideas about effective teaching. Let's see what this combination is? It is the combination of subject knowledge and general knowledge.

For good teaching, the teacher must have good subject knowledge. They must accumulate several facts about their subject, and they should enrich with all

facts relevant to their subjects. In addition, they must have good general knowledge. This should be about the day-to-day routine of the school, school environment, social knowledge, knowledge about community, and knowledge about common things. Also the teacher needs practical knowledge.

This means is “doing” knowledge or “active” knowledge. For example, how to do classroom routine, practical work, how to use learning and teaching aids and instruments. And the knowledge of how to use the theoretical knowledge in a practical environment.

As a teacher we want to develop attitudes through this knowledge. Through practical knowledge students can develop their skills, their moral side and personal development.

And other factor is human resources. Human resources are very important for effective teaching. You know what these human resources are? Students, teachers, and others in the school. All these peoples help your teaching.

How can you be an effective teacher? You should have good training; through this training you can develop your subject knowledge and your teaching strategies. These factors improve teaching ability.

In addition you should use relevant teaching and learning aids. With those we can see, in the effective classroom, students are ready for learning, And they have good attitudes for their learning. This is very important to develop a good lesson.

Q4- *My schooling experience and my theoretical knowledge and a little of my practical experience I gained from my course.*

Q5- *I do not have much experience, but my theoretical knowledge that I gained from my course subjects and my little practical knowledge helped me to draw this map.*

Q6 /7- *Students and teachers; they are both responsible for effective teaching, because they are playing active roles in the classroom.*

You know, what I meant, there are more issues related to the development of effective teaching. For example, teachers, students, and others in the school.

Sometimes parents, they all are very important, but teachers and students are the most important.

Why? The combination of theoretical knowledge, practical knowledge, and human resources creates effective teaching. So both teachers and students must also play their roles well.

(18th January, 2003)

Map 2

Q1-*According to my new opinion effective teaching is a supply of good knowledge and skills to students by the teachers.*

So, teacher and students actively participate in class and what knowledge they gain. This knowledge includes theoretical knowledge and practical knowledge. Practical knowledge is very important, because it can develop a student's personality. Under theoretical knowledge we can develop subject knowledge and general knowledge, because they make very good relationships through teaching.

Not only the resources. The teacher and students are very important parts of effective teaching, because without them you can't reach your goals. What I meant is we can't develop our student's learning.

And also the teacher must have good training for their teaching. This training and experience are also important. Through experience teachers can develop their teaching skills and knowledge. You know, without good subject knowledge and good skills they can't present a good lesson. You know, your sound subject knowledge, good teaching and managing skills are important and necessary to manage your class well. Otherwise, the teacher can't teach well.

On the other hand, students need aims and positive attitudes for their learning. If you haven't aims you can't achieve your target. The same thing happens to students.

And students must have good attitudes about their learning and teaching. These good attitudes help them to develop their knowledge and their learning. You know, both teachers' skills and training, and students' aims, and positive attitudes are important to achieve good teaching.

***Q 2/ 3-** I changed my first map structure. Here I placed 'knowledge' 'teacher' and 'student' as main concepts, and I developed one more concept under 'student' aims'. You can see here most of the concepts under the concepts of teacher and student I have focused into the concept of 'learning'.*

***Q4-** Because, when I gained experience I realised that 'student' and 'teacher' should be placed as main concepts, because they are the main roles in your class.*

And 'knowledge' are also important. Without sound knowledge teachers can't improve their students,

***Q5-**I developed all these ideas through the experience that I got from my practicum.*

You know, my practicum site was a very popular grade one school. It had been richly resourced by the ministry, and I was fortunate, with a very good principal. I had a very helpful principal. He guided and advised me very well.

And I had very good experiences and an effective mentor teacher. My mentor teacher's class was really interesting. She manages everything well and asked me to observe her work, which I have done. When I was teaching she supervised and gave some directions and guidance. Much of the time she did motivate me. It was an exciting and rewarding experience.

Sometimes I discussed things related to my teaching with my mentor teacher and with my supervisor. As results of these discussions, I reflected on my teaching, and I tried to change my knowledge and behavior in the classroom. I changed my previous ideas about effective teaching, because of my new experience.

***Q6 /7 _** My opinion is that both teacher and students are important to effective teaching, because their active participation in the lesson makes a good learning environment.*

(1st February, 2003)

Map 3

Q 1-I mentioned earlier, effective teaching is effectively giving knowledge to students by teachers. To do this teachers and students want resources.

What I mean is, effective teaching incorporates four issues: knowledge, teacher, students and resources; and to give good knowledge to their students, teachers require good subject knowledge.

In addition, good teaching skills and good management skills are also required. And teachers must have the ability to control their class. This is very important, because if you can 't control your class, you can't present a good lesson.

Knowledge consists of theoretical knowledge and practical knowledge. Through theoretical knowledge you can give subject knowledge as well as general knowledge.

You know, good teaching is not just teaching a subject. Because you want to teach for life. Through practical knowledge you can develop students' moral side, skills and personality. If you just teach your subject you can't develop these things.

It is a very important thing to give theoretical knowledge as well as practical knowledge. So, you need good managing and teaching skills for effective teaching and you must manage your class well, and then use good teaching and learning skills. This is important, because if you can't control your class, you can't present a good lesson.

You can see here I put the concept of 'resources', because resources are very helpful to develop both teaching and learning. Without resources teachers can't develop a good learning environment within the class. Those resources help teachers to demonstrate, present their teaching well. and develop their strategies. They help students to gain good understanding .

Here you can see the concept 'student'. Under this I placed aims and needs, because students must know their needs and learning aims. This student concept I cross-linked to the personality concept, because a student with good aims and needs can develop their personality through learning.

Students must have needs and aims for their learning. If students have this you can develop their skills and moral side easily, because they are ready to learn something. While developing these things, students must gain good

personalities. So, when you are doing teaching you should be concerned about all these things. Then you can do effective teaching.

Yes, my final concept map is different to my previous two maps. Because, finally, through my experience, I realise what effective teaching is. While getting practical experience I re-organised my ideas about teaching.

So, when you are teaching you should be concerned with all these things, because, interacting with students I realised what I want to do for their learning.

You know, lots of my practicum experience affected my changes. If I want to be a good teacher I need to evaluate my teaching by myself.

Q 2/3- *Yes, especially, one more main concept; resources. As a lower level sub-concept I placed 'personality'. Most of the others are similar, but with more cross-links.*

Q4- *Because, when I gained some experience I saw lots of relationships between those concepts, and I also saw some other concepts related our teaching.*

Q5- *My practicum experiences affected my teaching very much.*

You know, most experienced teachers at my practicum site helped me to develop my ideas, and especially my mentor teacher. She affected my change in understanding,

Not only that, I did really interesting things between the two practicum phases. I participated in two reflective workshops and one problem solving sessions. All these things were conducted by my college. The reflective workshops were very important, because I discussed my experience with my colleagues. Sometimes with my lecturers. Those discussions were gone into very deeply.

Finally I reflected on my own experiences. Through those reflections I understood what teaching was. And also teachers' roles. Especially, reflection of my practicum site experiences influenced me to change my knowledge.

The second time I went to school with those understandings. I could have developed my understanding more with in my school environment, because of my mentor teacher, the principal and other experienced teachers acted in more

ways to develop my knowledge. They tried to provide more and more information when I asked them questions. Some teachers invited me to participate in their classroom activities. We made some teaching aids and learning aids together. We also discussed some problems related to our teaching and students' learning. So those things were very interesting. I received much more from them.

As a results of these things I re-organised my knowledge. My new understanding is represented by the new map.

***Q 6/7-**I think these entire concepts are equally important for teaching because each one equal important for your teaching.*

***Q 8-what do you think about the research method, that is the use of concept map?** Of course, that method was very attractive. I really enjoyed it. It was well organised. When I was drawing my concept maps, I understood the relationships between the concepts. It was a good exercise and this method really influenced me to organise my ideas. It was a very challenging exercise.*

(3rd march, 2003)